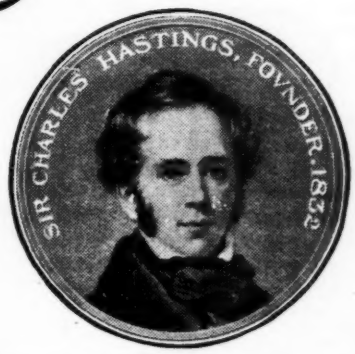
NOV 26 1923
Medical Lib

The

British Medical Journal



THE JOURNAL OF THE BRITISH MEDICAL ASSOCIATION.

WITH SUPPLEMENT.

No. 3280. SATURDAY, NOVEMBER 10, 1923. Price 1/3

CASEIN-LACTALBUMEN BREAD IN DIABETES.

'ALLENBURYS' DIABETIC FLOUR

A special preparation of caseins and lactalbumen with leavening agents for the home preparation of fresh bread, biscuits, cakes, etc., free from sugar and starch.

The 'Allenburys' Diabetic Flour is so composed as to require but the ordinary art of the cook for its manipulation. Recipes and working directions are provided.

Composition:

	Per Cent.
TOTAL PROTEINS	87·0
FAT	0·7
SODIUM BICARBONATE	1·6
ACID POTASSIUM TARTRATE	1·6
MOISTURE	9·1

A Doctor writes:

"I have tested the sample of 'Allenburys' Diabetic Flour which you recently sent me and find it makes admirable bread, etc.; it is both more easily digested and more palatable than any similar preparation I have come across."

Further particulars and clinical trial sample will be sent on request.

ALLEN & HANBURYS Ltd.,
37 Lombard Street, London, E.C. 3.

THE "PLUROSTAT"

(REGD. TRADE MARK) **FOR THE SURGEON AND GENERAL PRACTITIONER** (REGD. DESIGN)

This NEW UNIVERSAL APPARATUS provides:—

GALVANIC CURRENT for Ionic Medication, Electrolysis, etc.,
SINUSOIDAL CURRENT,
GALVANO-SINUSOIDAL CURRENT,
FARADIC CURRENT,
GALVANO-FARADIC CURRENT,
CAUTERY,
LIGHT for Cystoscopes, and every type of Surgical Lamp,
MOTOR POWER for driving Pneumo-Massage Pumps, Centrifuges, Surgical Drills, Burrs, Trephines, Vibratory Massage Apparatus, Leduc Commutator, Rhythmic Interrupter etc.

Specially Designed Dynamo to supply current to Patient Independently of Main Supply Driving Motor.

As supplied in great numbers for use in the Electrical Departments and Operating Theatres of Hospitals, Pension Clinics, &c., throughout the country.

PROMPT DELIVERY.

Manufactured throughout at our own Factory.

This apparatus is fully described and illustrated in the "BOOK OF THE PLUROSTAT," 28 pages, post free on request.

The Cox-Cavendish Electrical Co., Ltd.,
105, GREAT PORTLAND STREET, LONDON, W. 1.

BRANDY
for
ILLNESS
means
MARTELL

An Address
ON
THE HABITS (ECOLOGY) OF TUMOURS.

Delivered to the Cambridge University Medical Society, November 7th, 1923,

BY

Sir JOHN BLAND-SUTTON, P.R.C.S.,
CONSULTING SURGEON TO THE MIDDLESEX HOSPITAL.

Writings which attempt to define the term "tumour" make a big literary rubbish heap. The name though undefinable is applied to a hotch-potch of morbid conditions. A mouse is a mammal, so is an elephant—they have features in common. Many morbid conditions called tumours have sufficient features in common which permit them to be classified for descriptive purposes, for clinical study, and for treatment, but in size and habits they vary as much as mice and elephants.

Tumours are of importance to surgeons because of their harmfulness to the individuals on whom they grow. Nearly all make life uncomfortable; many shorten life. Surgeons do their best to get rid of them and study their habits (ecology) in order to acquire increased proficiency in this respect.

The microscope taught us that the tissues of tumours do not differ from those normal to the body, and with the assistance of embryology the investigation of tumours has become for many an attractive study. Embryology has provided the key to many pathological riddles. I vainly imagined that it would help to solve the problem of the origin of tumours, and a large part of my leisure for many years was devoted to this quest.

I shall endeavour to show how the life history of a tumour corresponds with that of the parent organ. Tumours pass through a period of growth, attain maturity and in some instances exercise the same function as the parent organ; and this exercise by increasing their bulk leads to their discovery. The statement that tumours exercise no function is grossly erroneous.

The tissues of tumours do not differ in their habits (ecology) from the normal tissues of the body.

Take, for example, hyaline cartilage. When this tissue assumes the form of a tumour its naked-eye and microscopic characters are identical with normal cartilage. It often calcifies, and becomes converted into bone. Like cartilage covering the articular end of a bone, it may be smooth and glistening; if submitted to friction a synovial membrane forms over it, constituting a gliding capsule; the space enclosed by the capsule may become distended with synovial fluid. Many instances are known in which a bursa of this kind, formed over an exostosis, has contained loose bodies in every respect resembling the familiar joint-mice of normal articular cavities. Exostoses of long bones repeat the phases of development common to such bones, and during growth are capped with cartilage which behaves like an epiphysis; the growth of the exostosis ceases with that of the skeleton.

Tumours not only agree in structure with the tissues of the organs in which they arise, but they conform to the habits of the parent organ.

Composite odontomes are tumours derived from the germs of teeth and conform to the ecology of teeth. Ensconced in the jaw an odontome grows in silence. In due time this quiescence is disturbed and the tumour manifests its relationship to teeth by erupting. The chief signs are swelling of the gum and pain such as accompanies the cutting of teeth. These troubles lead to its discovery, which usually ends in its extraction. Some superstitious persons will not submit to its extraction; even then the natural process is triumphant, for the tumour may fall out spontaneously, or, in spite, the patient spits it out! In a few instances an odontome has erupted and taken its place in line with normal teeth and been used in mastication. This has happened to men and horses.

Tumours in hollow viscera can excite them to action.

A tumour growing from the walls and projecting into the cavity of a hollow muscular organ can excite its muscular tissue to contract. A fibroid, a lipoma, or a cluster of warts growing in the gastro-intestinal tract stimulates propulsive movements leading to invagination of the intestine. Many astounding examples have been recorded. A submucous fibroid growing in the gastric wall near the oesophageal opening has been propelled through the pylorus into the duodenum, invaginating the parts with fatal consequences. Invagination of the small intestine is often caused by a sessile tumour. The persistent propulsive action of the muscular tissue converts sessile into stalked tumours. The contractions of the gut excited by a polypus are declared by painful sensations called cramps.

An old woman had a tumour, the size of a walnut, protruding at the anus. A surgeon of experience cut it off and was surprised to see the vermiform appendix. The tumour in this case arose on the margin of the ileo-caecal valve and induced invagination of the whole colon.

The efforts of the uterus to extrude a submucous fibroid may be so vigorous that the organ inverts. A pregnant uterus in its endeavours to expel the placenta sometimes turns inside out. The ovaries and Fallopian tubes occupy the peritoneal pouch formed by the inversion.

A tumour can initiate functional activity in an organ.

A submucous fibroid can imitate pregnancy so successfully as to deceive experienced practitioners. When an oösperm embeds itself in the endometrium the uterus, in the course of a few months, is converted from an organ weighing 2 to 3 oz. to one weighing 2 to 3 lb., with a capacity of one gallon. At the end of 280 days the slow rhythmic contractions of the uterus, stimulated by the growing foetus, ultimately become so powerful that they expel the foetus, the placenta, and the membranes which contain the foetal excrementitious products. When pregnancy occurs in the rudimentary horn of an imperfect uterus, or in a Fallopian tube, the foetus cannot escape from its mother and is mummified; in course of time it becomes converted by the deposit of lime salts into a lithopaedion.

After a successful pregnancy the uterine tissue undergoes an autolytic change (which means it is transformed into soluble nitrogenous extractives) and slowly shrinks to nearly the same size and weight of an unimpregnated uterus. Similar changes may be observed in a uterus occupied by a submucous fibroid. As the tumour grows the uterus enlarges uniformly and as it rises in the hypogastrium becomes easily obvious on examination. When the tumour is soft and grows rapidly a murmur is audible on auscultation. The uterus persistently endeavours to expel the tumour and sometimes succeeds in forcing it into the vagina. This success is accompanied with painful spasms and bleeding so like a miscarriage as to sometimes deceive the medical attendant or a midwife. As a rule, the uterus fails to expel the fibroid and it slowly enlarges year by year, then ceases to grow, slowly dies and is mummified, and in many cases calcified. Large calcified fibroids and lithopaedia may be found in pathological museums and in disused graveyards.

Submucous fibroids, especially when complicated with pregnancy, undergo autolysis, and this process will reduce a submucous fibroid the size of a fist to the consistence of soft soap in two weeks. The comparison between the ecology of a submucous fibroid and normal pregnancy is emphasized when the fibroid stimulates a large corpus luteum to form in the ovary and mucous fluid exudes from the nipples.

Erosive Action of Villi in Relation to Tumours.

Villi of various kinds play a part in our lives usually for good; sometimes for evil. Embryologists and pathologists were surprised to learn that the delicate villi of the chorion embed themselves in the endometrium to form the foetal part of the placenta. Occasionally their erosive power enables them to pierce the uterine wall and peer into the peritoneal cavity. It was a greater surprise to learn that

such delicate structures sometimes acquire malignant power and penetrate blood vessels. Fragments detached from such villi become emboli, and lodge in distant organs, embed themselves, and establish new tumour colonies. This disease of the villi, now well recognized, is described as chorionic cancer.

Arachnoid Villi.

It is well known that the pits in the cranial vault, familiar to students of human osteology as the foramina for the Pacchionian bodies, are due to the erosive action of arachnoid tufts; but it is a recent discovery that these villous bodies sometimes grow luxuriantly, overrun the adjacent bones, and produce in them extraordinary changes.

In 1885 Sir William Stokes described the skull of a male Cingalese (Fig. 1), and on the vault of this skull there is a mass of bone resembling a crown of loosely compacted coral. The tissue of this crown is intimately incorporated with the vault of the skull, and the whole mass is permeated with neat vertical pits. Each "pit" is really a tunnel, and as neat as a Pacchionian pit. These tunnels are exaggerated Pacchionian pits produced by pathological arachnoid tufts. Professor S. G. Shattock has made a thin transparent section of the crown, and the tunnels can be seen traversing it completely. There are hundreds of tunnels in this crown, and they recall holes in ship-timber bored by the teredo or those in limestone made by whelks (Pholas).

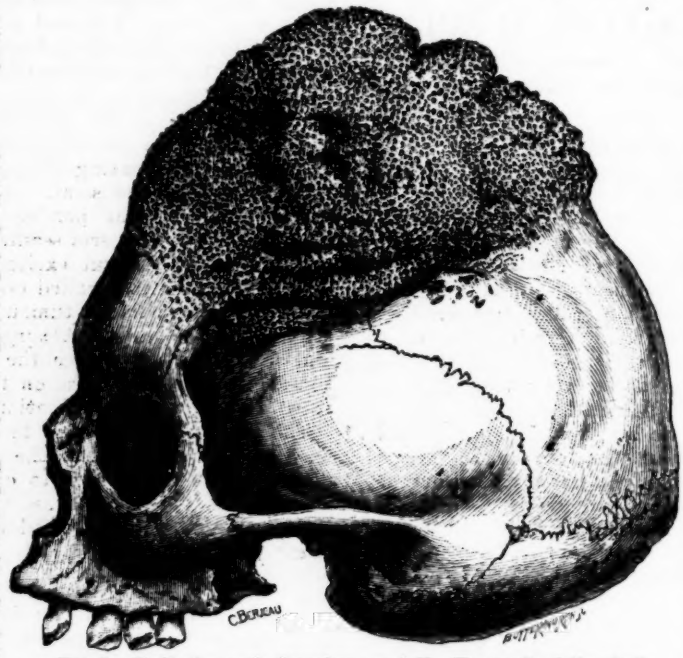


FIG. 1.—Skull of a male Cingalese, aged 20. The vault of the skull resembles a crown of loosely compacted coral. The mass is traversed by hundreds of tunnels—exaggerated Pacchionian pits—which open on the surface. The orifices are represented, for the sake of emphasis, too big. (Museum, Royal College of Surgeons.)

In recent and unmacerated hyperostoses of this kind arachnoid villi can be demonstrated in the tunnels. In the head of the patient there was a layer of gelatinous material over the bone, between it and the scalp; it also filled the tunnels. The dura adhered to the bone and to the surface of the brain.

When this extraordinary specimen was described by Stokes no one had the least suspicion that such a change could be produced by arachnoid villi. Dr. W. G. Penfield, in 1921, began a careful study of the intracranial tumours preserved in the museum of the National Hospital for the Paralysed and Epileptic, Queen Square, London. He has proved that the soft tissue of the tumour arises within the cranium, pierces the dura, and involves the overlying bone. The action of the tumour elements leads to complete rearrangement of the osseous tissue between the tumour and the scalp. It is a singular clinical feature, in many of the patients, that the presence of the hard sessile boss of bone was the first sign of disturbance. In some the first symptom is intense pain beneath the bony boss. In such patients epileptic seizures are common. In a few instances the tumour has been attributed to an intensive local injury, such as a blow upon the head.

In addition to the skull of the Cingalese the museum of the Royal College of Surgeons contains a similar and equally remarkable example obtained from a miner, who died in the General Infirmary, Leeds, 1904. Eleven years previously he fell backwards and bruised his head. The bruise did not subside and continued to increase. The man complained of headache and occasional diplopia. With the hope of arresting the growth of the tumour the left external carotid artery was tied, but death followed the operation in ten days. The hyperostosis involves the left parietal, adjacent parts of the occipital, and the squamous portion of the temporal. For the most part the normal tissue has been replaced by exceedingly dense bone, and a plaque-like portion extends within the skull. The dura adhered to this part of the tumour (Fig. 2).

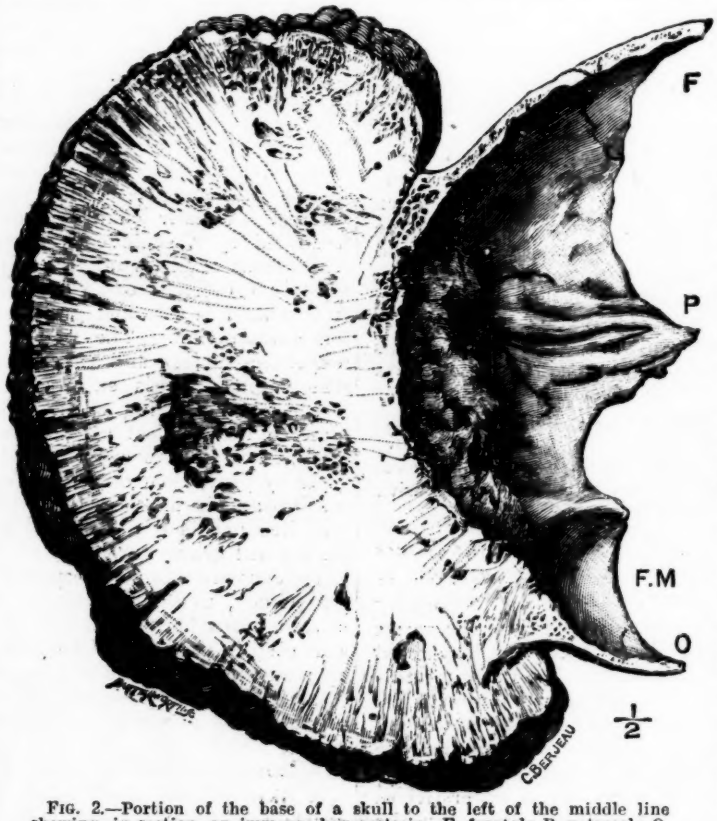


FIG. 2.—Portion of the base of a skull to the left of the middle line showing, in section, an immense hyperostosis. F, frontal; P, petrosal; O, occipital; F.M., foramen magnum. (Museum, Royal College of Surgeons.)

Skulls changed in this way could not escape the observations of pathologists. Some examples have been described by French writers as hemicraniosis. The frontal is the bone of preference, but the parietal and squamosal are often involved. The relationship of cranial hyperostosis to meningeal tumours has also been considered by American surgeons — Spiller and Cushing among others.

The relationship of an arachnoid tumour to the osseous elements is well shown in a specimen preserved in the museum of St. Bartholomew's Hospital (Fig. 3). The patient was under the care of Sir James Paget. A section prepared for the microscope, contained in the museum cabinet, shows well the villous nature of the tumour.

The merit of Penfield's excellent essay is his demonstration of the soft tissues which fill the tunnels in the cranial hyperostosis, and I enjoyed the privilege of examining the specimens he prepared for microscopic investigation.

Penfield prefers to use the name "endothelioma" for these tumours; but names are only convenient labels, and in this case matter little if we keep in mind this

important fact: The epithelium, and the associated soft tissues lodged in the tunnels of the osseous bosses, spring from the arachnoid—*they are, in fact, abnormal arachnoid villi*. When examined in sections these exaggerated villous tufts embedded in osseous tissue resemble fossil ferns in clay or shale. The bony edifice on the skull recalls the huge mounds built by termites in tropical forests.

TUMOURS OF GLANDULAR ORGANS.

Tumours of glandular organs are often functional. Take, for example, an adenoma of the breast. This is a collection of mammary tissue isolated from the main secretory tissue by a firm capsule which cuts it off from the excretory ducts of the breast. Such a tumour in the breast of a pregnant woman takes on its share of lactation in due course, but as there are no ducts permitting the fluid to escape it accumulates in the glandular acini and the pressure of the fluid leads to atrophy of the secreting epithelium, dilatation and coalescence of the distended acini, and the formation of cavities. Such an encapsuled collection of fluid is known as an adenocele, and when large enough to attract the attention of a surgeon is, as a rule, excised.

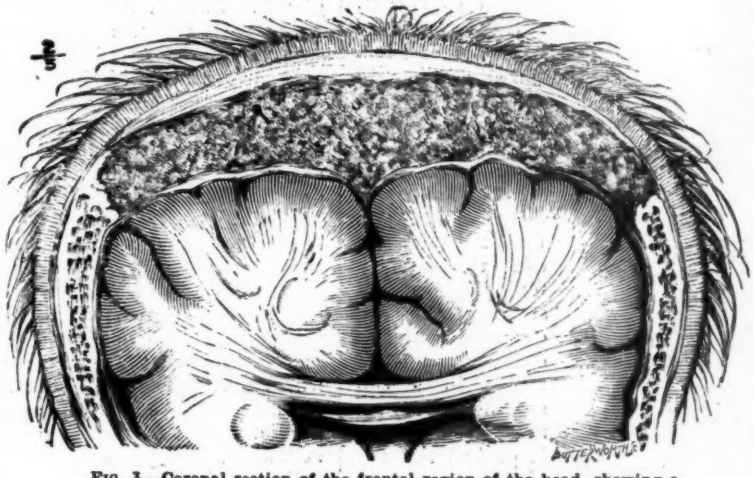


FIG. 3.—Coronal section of the frontal region of the head, showing a soft tumour growing from the arachnoid, permeating the frontal bone. (Museum, St. Bartholomew's Hospital.)

A lobe of mammary tissue occasionally becomes detached from the axillary margin of the breast. Such a glandular islet has no excretory duct, but it enlarges during lactation in concert with the main gland and slowly declines when lactation ebbs. These islets are known as accessory breasts, but a similar islet in the substance of the breast would rank as an adenoma or a cyst.

Similar cystic tumours form in the liver in connexion with the minute bile ducts. Paul proved long ago that adenomas of the liver are clumps of encapsuled biliary ducts. The cells of such adenomas are functional and the cystic spaces contain bile. The solitary (non-parasitic) cyst of the liver, though rare, belongs to this set. Some of these cysts have been so large in women as to have been mistaken clinically for ovarian cysts. In such examples as have been examined microscopically the walls of the cyst contained minute bile ducts. I have satisfied myself that these large cysts arise from the dilatation and fusion of the minute biliary ducts unconnected with obstruction to the main bile ducts. It is certain that the parts concerned in the formation of such cysts have continued to exercise their function, for they contain bile.

As in the case of the mammary gland, an isolated lobe of liver attached to the liver by a fibrous band is called an accessory lobe of the liver, but a similar islet of hepatic tissue in the substance of the liver is called an adenoma, and may become a cyst by the accumulation of its own secretion—bile.

We owe to von Eiselsberg an account of a remarkable illustration of this habit of glandular tumours. Billroth in 1886 extirpated a goitrous thyroid from a woman aged 38. The operation was followed by myxoedema. A year after the removal of the thyroid the patient passed through a normal pregnancy; subsequently a tumour appeared in the upper part of the sternum, and as it increased in size the myxoedema disappeared. In 1892 the sternal tumour was as big as a fist and resembled a sarcoma. As it was incorporated with the bone von Eiselsberg removed it with the aid of a chisel and hammer. In structure it resembled an ossifying columnar-celled carcinoma and contained colloid material. The woman made a good recovery, but the symptoms of myxoedema recurred in the same order as after the thyroidectomy and persisted.

The thyroid gland, possessing no excretory duct, is very liable to have portions of its secreting tissue isolated, and these, becoming encapsuled and slowly enlarged by the accumulation of colloid material, form thyroid cysts and tumours, some of which attain an astonishing size.

The cell elements of primary and secondary cancer of the pancreas can produce ferments identical with or similar to those furnished by the normal cells of the gland (Waring). The active interest taken by physiologists in the function of the pancreas, especially in relation to glycosuria, has led to some valuable experimental work. In 1892 von Mering and Minkowski succeeded in completely removing the pancreas from living dogs. In man this is an impossible operation on account of its intimate relations with blood vessels and nerves. In dogs complete removal of the pancreas is followed in a day or two by glycosuria. Hédon confirmed the experiments (1892) and succeeded in transferring a piece of the tail of the pancreas into a subcutaneous pouch to one side of the linea alba, but retaining its intra-abdominal connexions. When the graft is well established the remainder of the pancreas is completely removed and glycosuria does not ensue. Later if the graft is excised glycosuria quickly follows. If the intra-abdominal vascular connexions of the graft are obliterated the graft scleroses and disappears; under such conditions glycosuria quickly becomes manifest. Hédon notes that after the graft is transformed to an artificial subcutaneous pouch, a fistula persists for a time and pancreatic fluid issues from it.

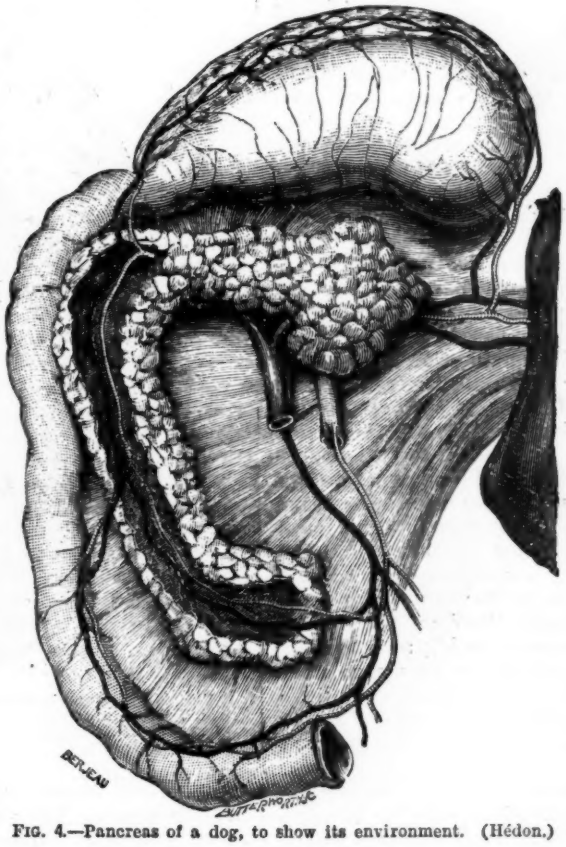


FIG. 4.—Pancreas of a dog, to show its environment. (Hédon.)

The skill and care required to remove completely a dog's pancreas successfully is appreciated by surgeons who have performed operations on the pancreas of man. The intimate connexions of the pancreas with the duodenum in dogs is shown in Fig. 4.

FIG. 5.—Harlequin foetus.

Colloid Omentum.

Extraordinary examples of functional activity in cancerous epithelium may be studied in the gastro-intestinal canal. The mucous membrane of this tract contains cells that secrete mucus. In the stomach the cell covering is almost entirely formed of them; in a cell swollen with mucus the nucleus is pushed towards the basement membrane. When the mucous membrane is cancerous, the epithelial cells often furnish large quantities of mucus, which infiltrates the omentum and converts it into a gelatinous mass, commonly called "colloid omentum." The mode in which this change is produced can be explained, and my knowledge of it has been obtained in the course of operations performed on the stomach for the relief of gastric disorders.

When the stomach contains a focus of cancer the cylindrical cells, heavily charged with mucin, permeate its wall, fall into the lesser bag of the peritoneum, engraft themselves, and appear, in the early stages, as small yellow flakes. At this stage microscopic examination shows them to consist of clumps of columnar cells full of mucin. These pathological or secondary foci of cancer act as glands and shed mucus in abundance into the omental fold. Such foci multiply, and being reinforced by cell-showers from the primary focus invade the omentum and convert it into a mass of "colloid" weighing many pounds. Omentum changed in this way sometimes forms such a large mass that it has been mistaken in women for a big ovarian tumour. It is not uncommon when cell-showers of this kind fall from a primary focus in the stomach or the colon for the epithelium to engraft itself on the ovaries and convert them into colloid tumours as big as coco-nuts. Implantation tumours of this kind are by no means rare, and as they are now appreciated by surgeons there is little danger of such enlargements, secondary to primary cancer of the stomach or colon, being mistaken for primary ovarian tumours.

I have considered these conditions especially because, in dealing with the large multilocular glandular tumours of the ovaries, there is a possibility of error unless care is taken in the microscopic examination of the tumour.

OVARIAN DERMOIDS.

Dermoids have an irresistible attraction for me. They prove that many tumours owe their grossness to the accumulation of retained secretions.

The simplest example is a sequestration dermoid on the face or scalp. This takes the form of a globular tumour with a central cavity lined with skin furnished with dermal elements—epidermis, sweat glands, hair bulbs, sebaceous glands. In such tumours the epidermis is continually shed with hair, sweat, and sebaceous grease into the central cavity. The dermoid slowly enlarges in consequence, and a tumour of this kind, no bigger than a pea or a walnut at birth, may in twenty years be as big as a coco-nut. When such a tumour is opened and the contents cleared away the skin lining its cavity will sweat when the patient sweats, and the fluid can be seen oozing from the sweat ducts. The skin lining the tumour is sensitive to the prick of a pin.

The most impressive examples of functioning tumours arise in the ovary, and the growth of our knowledge concerning these tumours reads like a fairy tale. Fifty years ago dermoids puzzled pathologists, but in the interval much knowledge has been gained concerning them. It is now established that these tumours are the products of ova which have become active and developed into ill conditioned foetuses independent of the stimulus of spermatozoa. *An ovarian foetus produced in this way is called an embryonal rudiment.*

Before dealing with the relation of ovarian embryomas to the products found in their sacs some matters must be considered relating to the activities of a normal uterine foetus.

In the mid-period of gestation the foetus floats freely in a hydrosphere formed by amnionic fluid. There are four sets of organs functional—the placenta on which its life depends, the kidneys, choroid plexuses, and skin with its epitrichium. The urine discharged by the kidneys mingles with the amnionic fluid. If the urine is hindered from

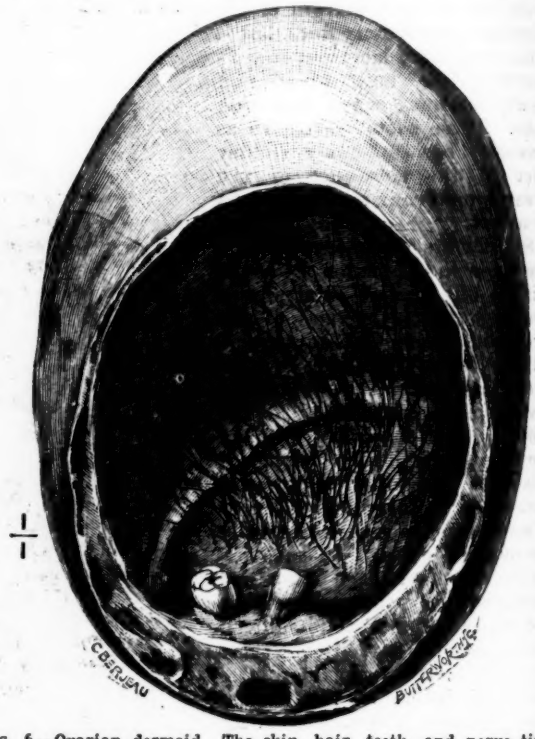


FIG. 6.—Ovarian dermoid. The skin, hair, teeth, and nerve tissue which it contains may be regarded as representing the cephalic end of an ovarian embryoma. From a single woman aged 26. (Museum, Middlesex Hospital.)

escaping the kidneys will become transformed into hydronephrotic sacs. The choroid plexuses secrete cerebro-spinal fluid, and if it cannot escape from the fourth ventricle hydrocephalus occurs. This is a common malformation, and museums contain examples by the score. The skin is active,

lanugo grows freely, and the epidermis develops the epitrichium (described by Welcker in 1864) which furnishes the soapy vernix caseosa so conspicuous on the skin of a newborn child. In an embryo the whole of the epidermis consists of a single layer of cells. Later this becomes double and the superficial layer is the epitrichium. About the eighth month the epitrichium is cast off, mixed with grease from the sebaceous glands, and lanugo. Occasionally it persists and forms a collodion-like envelope over the foetus, producing the comic appearance which recalls the harlequin (Fig. 5). The epitrichium persists in aquatic creatures such as frogs and salamanders; it protects them from maceration. The human foetus is an aquatic animal while disporting in the hydrosphere; the epitrichium and the vernix caseosa protect it from maceration.

Normal pregnancy terminates with the expulsion of the foetus and the by-products of its glandular organs. If all goes well it becomes an air-breathing mammal. It sometimes happens that a foetus cannot be expelled. In this event the placenta on which its life depends ceases to act and slowly disappears. The amnionic fluid dries up, the foetus dies, shrinks, mummifies, and eventually its tissues become calcified.

The life of an intrauterine foetus is dominated by the placenta.

FIG. 7.—Loculi of an ovarian tumour lined with big mucus-laden epithelium. (Magnified.)

THE EMBRYOMA.

An embryoma, the essential element of an ovarian dermoid, may contain nearly every organ required for the equipment of a foetus: skin with its essential glands, hair and teeth, pigment and nerves, limb-buds with cartilage and bone, fat and muscle, brain and spinal cord, nerves and ganglia, an eye, gut, and Auerbach's plexus (Nicholson); trachea and thyroid gland, liver tissue (Warwick).

For many years pathologists limited their search to the histology of these lumps. Professor S. G. Shattock critically reconstructed some of the sections. For him nervous tissue collected around a central tube is a syringo-myelus. Grey matter enclosed in dura mater is a miniature brain. C. E. Shattock removed an ovarian tumour the size of a bantam's egg from a girl aged 2½ years. The tumour on median section disclosed an embryoma which can be interpreted as an acormus-embryoma; it is trunkless and limbless, consisting only of a hydrocephalic head. The vault is membranous and the base cartilaginous. A piece of hairy scalp is attached to the head and, near it, some tissue consisting of groups of ganglia furnished with large typical nerve cells. This specimen is preserved in the museum of the Royal College of Surgeons.

The importance of interpreting the gross features of embryomas, with the aid of histological details, adds a new interest to these deformed lumps; they seem like misdirected embryologic energy. The ovarian dermoid shown in Fig. 6 is actually the size of a coco-nut and contained the usual mixture of grease and hair. A remnant of the ovary is seen at the lower pole of the tumour and immediately adjacent there is a patch of skin covered with reddish hair resembling a piece of scalp. Two teeth, an incisor and a bicuspid, are fully erupted. The tissue immediately under the skin contains a collection of nerve tissue with cells like those in grey matter of the brain. The skin, hair, teeth, and nerve tissue may be interpreted as representing the cephalic end of an ovarian embryoma (Warwick). The loose matter filling the cyst is furnished by sebaceous glands, hair, and desquamating epidermis. The cyst wall, to meet requirements, grows in a most accommodating manner.

It is certain that an ovarian embryoma contains active organs, especially skin, which is continually discharging sebum and sweat, and shedding epidermic cells and hair. The embryoma has no time limit like a foetus, not being dependent on a placenta, and though it rarely exceeds the dimensions of a fist the products of its activity accumulate in the bag which encompasses it and may, in the course of years, amount to three litres or more. Occasionally the pressure of the accumulated organic rubbish bursts the sac and escapes into the peritoneal cavity, which may become so distended that the belly wall pits on pressure like dough. Sometimes the epithelial elements which escape from the sac engraft themselves on the peritoneum. In such circumstances hundreds of little islets of skin bearing tufts of lanugo dot the peritoneal surface of the intestines, liver, and omentum.

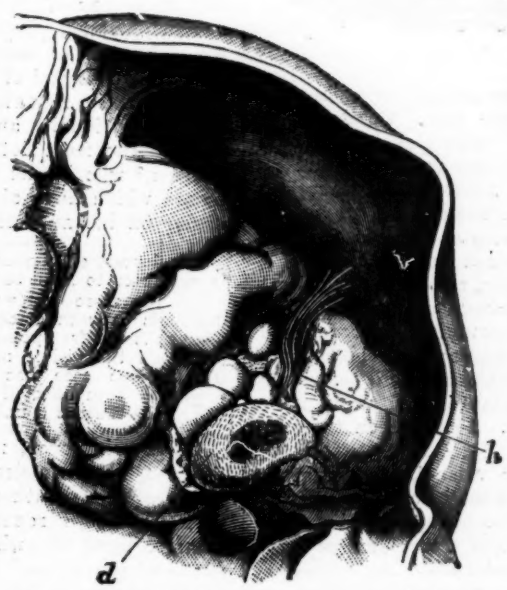


FIG. 8.—Segment of a huge mucigenous ovarian tumour presenting an embryoma, *d*, bedecked with a tuft of lanugo, *h*. (Museum, St. Thomas's Hospital.)

After an embryoma ceases to grow, its capsule, like the membranes of an extrauterine foetus, calcify; the museum of the Middlesex Hospital contains a good example, resembling a coco-nut containing a coil of hair, and three teeth on a plate of bone.

So far we have been dealing with ovarian embryomas in which skin played the prominent part in furnishing waste products. We must now consider some parallel conditions in which mucous membrane is the chief factor.

MULTILOCULAR GLANDULAR TUMOURS OF THE OVARY.

These are the biggest tumours which grow in women. Some of the tumours I have removed weighed nearly a hundredweight, and even bigger examples have been recorded. The loculi in such tumours vary in size and their walls are lined with soft tissue covered with a single layer of large columnar cells heavily charged with mucin (Fig. 7). The membrane lining the loculi is arranged in depressions, bays, and narrower recesses, recalling in their arrangement the simple glands of the large intestine. The amount of mucus furnished by them is often very great; as there are no excretory ducts for the escape of the secretion it accumulates in the loculi, which become enormously distended by the

products of the cells. It is a gelatinous substance now called pseudo-mucin. Often the walls of adjacent loculi rupture and allow neighbouring cavities to communicate, and in this way large chambers form. It is not uncommon for a loculus near the periphery of the tumour to burst and allow the contents to escape into the belly. In some of the cases the amount of pseudo-mucin that collects in the belly is almost beyond belief.

A spinster, aged 54, was under my care in 1899 on account of an enlargement of the belly. The physical signs suggested an accumulation of fluid. The pressure was so great as to produce a hernial protrusion as big as a bantam's egg at the navel, and a similar one over the left femoral ring. A tumour could be felt in the pelvis. I removed three gallons of mucin and a mucigenous tumour of the ovary equal in size to a coco-nut. There was a rent in its capsule opening up three loculi, and through this rent the pseudo-mucin secreted by the mucous membrane lining the loculi escaped into the belly. The tumour was easily removed and the patient reported herself in good health five years after the operation.

Un Chiffonnier.

Many similar cases have been under my care and observation, but all do not end in this simple way. Occasionally, when a mucigenous tumour bursts, clumps of cells escape from the walls and settle on the peritoneum and act as grafts, and become independent tumours, discharging pseudo-mucin, which helps to increase the general mass. In some women hundreds of these pathological glands grow on the serous membrane, and the amount furnished in this way, after the primary tumour has been removed, is so great that it is necessary to open the abdomen annually for the removal of the pseudo-mucin. In removing this material care should be taken to protect the edges of the abdominal incision; it occasionally happens that the epithelial elements in the pseudo-mucin accidentally implanted will grow in the scar and form independent tumours. I have seen them as large as ripe gooseberries.

Surgeons are familiar with these remarkable tumours, concerning which the following facts may be stated: It is not uncommon to find in a woman one ovary occupied with a dermoid and the other converted into a mucigenous cyst. It is not rare to find an ovary transformed into a bilobed tumour one lobe of which is a typical dermoid and the other mucigenous. The inner walls of isolated cavities are often covered with cylindrical epithelium loaded with mucin and indistinguishable from the large cells found on the surface and recesses of the rectal polypi so common in children. Mucigenous tumours are often so large that it is only by chance the embryoma is detected. Quite by chance I saw one on the cut surface of a huge tumour. The embryoma presented as a patch of skin, less than 2 cm. square, bedecked with a tuft of delicate lanugo (Fig. 8).

I have studied the histology of these tumours in season and out of season, and often asked myself the question, Why is the intestinal tract rarely demonstrable in the ovarian embryoma? Gradually I have realized that the mucin (or pseudo-mucin) of these tumours is produced by the gastro-intestinal epithelium of the embryoma, and this, the active agent in the production of mucin, is masked by the accumulated products of its own activity.

The matter may be briefly expressed in this way: In the common kind of ovarian embryoma the cutaneous elements are conspicuous; the products resulting from the activity of the skin preponderate and make up the bulk of the tumour mass. In mucigenous ovarian tumours the so-called "colloid stuff" is furnished by the gastro-intestinal epithelium of the embryoma.

In dermoid tumours skin prevails.
In mucigenous tumours mucous membrane prevails.

In France the man who picks up rubbish in the streets and collects it in the *hotte* on his back is called a chiffonnier. The membranes of a uterine foetus, or the sac of an ovarian embryoma, serve to remind us of the *hotte* of the chiffonnier. The simile helps to illustrate the thesis set out in the beginning of this lecture: *Many tumours become manifest by the accumulation of the products of their own activity.*

LITERATURE.
Eiselsberg: *Arch. f. klin. Chir.*, 1894, xlviii, 489.
Hédon: *Arch. de Physiologie*, 1892.
Minkowski: *Berl. klin. Wochenschr.*, 1892, 90.
Penfield, W. G.: Cranial and Intracranial Endotheliomata—Hemicraniosis, *Surg., Gyn., and Obstet.*, 1923, xxxvi, 657, with bibliography.
Shattock, C. E.: *Brit. Journ. of Surgery*, 1923, x, 39.
Spiller, W. G.: Hemicraniosis, *Journ. Amer. Med. Assoc.*, 1907, xlix, 259.
Stokes, W.: *Trans. Acad. of Med. in Ireland*, 1884, ii, 452.

ARSENICAL PIGMENTATION OF THE MOUTH AND SKIN.

BY
RALPH STOCKMAN, M.D.,
PROFESSOR OF MATERIA MEDICA AND THERAPEUTICS, UNIVERSITY OF GLASGOW.

PIGMENTATION of the skin, varying in depth of colour from a light mottled grey to black-brown, and in extent from a small area to the entire surface of the body, is now well known as one of the occasional effects of the ingestion of arsenic in repeated small doses. It has occurred also very exceptionally and in mild degree after a single large dose.[1] The most detailed account of it has been given by Nielsen,[2] who in the course of his article makes two statements which have also been made by many other writers, either on his authority or their own. He says:

"A deposit of pigment in the mucous membrane of the mouth seems never to have been seen"; and

"A far more trustworthy symptom, which will serve for the diagnosis between arsenical melanosis and argyria and Addison's disease, is the fact pointed out by several writers that in arsenical melanosis the visible mucous membrane is never pigmented. It is true one case has been reported,[20] in which the bulbus oculi had been affected by pigmentation, but no case apparently where the mucous membrane of the mouth had been so affected."

I have, however, now met with two cases in which not only was the skin deeply pigmented, but the mucous membrane of the mouth shared markedly in the discoloration. One of these I reported in 1921.[3] It was the case of a woman, aged 49, who had taken liquor arsenicalis daily for six years, and in that time had swallowed about 32,850 minims, equal to 298 grains (19.3 grams), arsenious acid. When I first saw her she had very extensive pigmentation of the skin, and keratosis of the palms and soles. The mucous membrane of the mouth and tongue had a bluish dark tint all over, and on the inner surface of the lower lip there was an irregular deep blue-black patch about the size of a sixpenny piece. She also had cirrhosis of the liver and ascites, but no neuritis.

The second case was that of a man, aged 57, suffering from pernicious anaemia, who developed marked pigmen-

tation of the skin and mouth while under my own observation and treatment in hospital.

When admitted he was extremely pallid, apathetic, and feeble; the red blood corpuscles numbered 800,000 per c.mm., and the haemoglobin was 20 per cent. He had taken no arsenic previously and was put on 10 minims liquor arsenicalis three times daily, this dose being continued for eighty days. By the end of that time the red corpuscles had risen to 2,400,000 and the haemoglobin to 41 per cent., but the arsenic had then to be discontinued as it was beginning to cause neuritis, evidenced by disappearance of his knee-jerks and tenderness of the posterior tibial nerves. He had taken 2,400 minims of Fowler's solution, equal to 21.8 grains (1.4 grams) arsenious acid. After he had been taking the arsenic for about one month it was evident that his skin was becoming pigmented. The pigmentation began, as it usually does, on the lower abdomen towards the flanks, but it spread and deepened very rapidly, until at the end of the eighty days the whole body was more or less discoloured. The lower abdomen and back, hips, and upper thighs were then of a black-brown colour, the rest of the trunk was of a bronze hue showing different tints and variegated with numerous small round white unpigmented spots, the face was light brown, and the arms and legs showed a mottled mixture of various shades of yellow and brown. The lines on the palms were picked out in a deeper brown than the surrounding skin. There was no extreme keratosis, but the epidermis of the hands and round about the knees was thick, reddened, and coarse, and showed a good deal of branny desquamation. About six weeks after beginning the arsenic several dark bluish patches appeared on the inner surface of the lower lip and at both angles of the mouth, the inner surface of the cheeks took on a uniform bluish colour with several deeper patches here and there, and there was one very marked brown area on the hard palate. When pressure was made with the fingers round about the patches on the lip and cheeks so as to render the area anaemic, their blue-black colour changed to a light brown, showing that the peculiar bluish-black tint is due to the purple colour of the capillary blood modifying the brown of the pigment present in the epithelial cells.

As regards the pigmentation of the skin and mouth I cannot say that the appearances differed in any way from certain cases of Addison's disease. There was, however, at parts, a distinct tendency to coarsening, hyperaemia, and branny desquamation of the skin, not seen in the latter. The colours in the mouth deepened considerably as he went on taking more arsenic. Within one week after stopping it there was a visible lessening of coloration both in the skin and mouth, and in a fortnight the change was more decided, and accompanied by fine scaly desquamation at the more deeply discoloured areas of the skin. In a month the face was nearly normal in colour, the forearms and legs were of a yellowish tint, and elsewhere the pigmentation had lessened. The brown patch on the palate had disappeared entirely, but the blue-black spots on the lips could still be easily made out. He then left hospital at his own request and died two months later of pernicious anaemia. By this time his skin had again become pallid, and there was little or no trace of pigmentation.

During the prolonged treatment with arsenic of cases of chorea, pernicious anaemia, lymphadenoma, psoriasis, and other chronic diseases, pigmentation of the skin and keratosis are not infrequently produced, but their occurrence must be considered as relatively very rare in proportion to the large number of cases which are so treated without any untoward effects. It is notorious that arsenic causes these and other pathological lesions much more rapidly and after a much smaller quantity in some persons than in others.[3] Thus, pigmentation, keratosis, and neuritis may appear in a few weeks or months, all together or singly, or may not appear at all even after years of arsenic administration. The reason of this variation in action is unknown, and for the present it has to be put down to individual differences or idiosyncrasy.

The skin coloration fades with very varying rapidity, sometimes in a few weeks, sometimes only after months, or in two or three years, and Cheadle[4] has recorded an instance of its being present after nine years and presumably permanently. In my experience it almost invariably disappears fairly rapidly, and has no deleterious influence on the general health. This is also true of keratosis, although it also may be very persistent, and arsenic cancer may result from prolonged irritation of the skin by the drug.[5] On the other hand neuritis, which is equally capricious in its incidence, is very tedious and difficult to cure, and its possible occurrence should always be carefully watched for and avoided. It may prove permanent and even fatal in extreme cases.[3]

It is difficult to determine exactly when or by whom pigmentation of the skin was first noticed as a result of the therapeutical administration of arsenic. Arsenious acid, realgar, and orpiment have been used continuously from the earliest medical times, and their acute poisonous effects have long been familiar, but knowledge regarding the symptoms of chronic poisoning has dawned much more slowly.

Arsenical paralysis is said to have been first recorded in the thirteenth century, and at infrequent intervals afterwards till 1857,[6] when it was more particularly described by Leroy,[7] and since then by very many others. In the eighteenth century, when various preparations of arsenic were widely and successfully used in the treatment of agues, it was known that they might give rise to paralysis and dermatitis, but there is no record of pigmentation. Thickening of the skin was noted by Hunt,[8] and later by Wilson (in 1873),[9] but it was only after 1888, when keratosis of the soles and palms and other parts was first definitely drawn attention to by Jonathan Hutchinson,[5] that this very striking effect of the administration of arsenic came to be generally recognized. Its employment in chorea is also comparatively modern. Harles (1811)[10] merely mentions it without comment of any kind, and Martin,[11] Salter,[12] and Gregory[13] seem to be the earliest writers who published accounts of cases successfully treated with it. Later Begbie[14] and Pereira[15] spoke very highly of its value from their own experience. In 1877 Byrom Bramwell first advocated its use in pernicious anaemia.[16]

Arsenic was first employed accurately and systematically in skin diseases by Dr. Thomas Girdlestone[17] of Yarmouth in 1806, and in 1847 Hunt,[8] and later Devergie,[18] in their treatises on diseases of the skin, describe brown and grey discoloration as if this were a recognized and not uncommon incident during its administration. Hunt describes the skin as having a "dirt-brown, dingy, unwashed appearance," and Devergie uses the terms "iron-grey" and "brown." Veiel (1860)[19] says it occurs "not seldom." Since then it has been described in great detail by many writers. The colour may be mottled light or dark grey, the mottling being due to irregularities in the depth of pigmentation, or it may be in all shades of brown—pale, yellowish, coffee, bronze, dull coppery, or almost black. It is never equally deep over the whole surface, or even in the same area of the body, and the tint is often modified at places by hyperaemia in underlying patches of the corium. Small roundish spots of unpigmented, or more deeply or more slightly pigmented, skin are always present, and this with the differences in colour-shades gives an impression of mottling. Warty growths are often present. On the rosa of the lips and mouth the brown deposit is modified to a dark bluish colour by the underlying tissues and blood, as has been previously mentioned, other instances of the same kind being the more familiar "blue line" of lead poisoning, and the bluish colour of the lips in dark-skinned races.

Erasmus Wilson[20] in 1868 gave an account of the nature of the pigment, which he describes as the ordinary melanin of the skin, and relates a case in which the eyeball presented a "dark tinge" in addition to deep cutaneous discoloration. But so far as I have been able to ascertain the two foregoing cases are the only instances in which pigmentation of the mucous membrane of the mouth has been recorded.

More careful examination of cases in which the skin is deeply pigmented would probably show, however, that the mouth is also not infrequently involved.

REFERENCES.

[1] Moreira: *Brit. Journ. Dermatol.*, vii, 378, 1895. [2] Nielsen: *Melanosis and Keratosis Arsenicalis*, New Sydenham Soc., 1900. [3] Stockman: *Edin. Med. Journ.*, July, 1921. [4] Cheadle: *Practitioner*, xxxvi, 90, 1886. [5] Semon: BRITISH MEDICAL JOURNAL, 1922, ii, 975. Hutchinson: *Trans. Path. Soc. London*, xxxix, 352, 1888; New Sydenham Society's *Atlas*. [6] Alexander: *Lähmungen nach Arsenik-Vergiftung*, 1889. [7] Leroy: *Gaz. hebdom. de Méd.*, 1857, 141. [8] Hunt: *Practical Observations on the Pathology and Treatment of Certain Diseases of the Skin*, 1847; *Diseases of the Skin*, ninth edition, 1871. [9] Wilson: *Lectures on Dermatology*, 1873, 151. [10] Harles: *De Arsenici Usu in Medicina*, p. 207, Nürnberg, 1811. [11] Martin: *Med.-Chir. Trans.*, iv, 45, 1813. [12] Salter: Ibid., x, 218, 1819. [13] Gregory: Ibid., xi, 299, 1821. [14] Begbie: *Monthly Journ. Med. Sci.*, i, 740, 1847. [15] Pereira: *Materia Medica and Therap.*, i, 714, 1854. [16] Bramwell: *Edin. Med. Journ.*, November, 1877. [17] Girdlestone: *London Med. and Physical Journ.*, 1806. [18] Devergie: *Traité des Maladies de la peau*, 1854, p. 106; *Bull. gén. de Thérap.*, 1869, 49. [19] Veiel: *Schmidt's Jahrbücher*, 1860, 108, p. 162. [20] Wilson: *Journ. of Cutaneous Med.*, i, 354, 1868.

THE RATIONALE OF PARATHYROID THERAPY.

BY

H. W. C. VINES, M.D.,

FELLOW OF CHRIST'S COLLEGE, CAMBRIDGE; FOULERTON RESEARCH STUDENT.

CHRONICITY of disease implies a stage in a pathological process at which neither the defence of the body nor the attack of the invading organism is making headway, but where the condition is that of an almost evenly balanced conflict. It is a balance between the effect of the parasite on the host and that of the host on the parasite, for in the first case the host has for some reason failed to respond sufficiently to the attack, and in the second the parasite is kept sufficiently in check to prevent an overwhelming onslaught. The main defence of the host lies in its cellular response, indicated by the mobilization of leucocytes and by the production of certain substances collectively called the antibodies. It is obvious that in chronic infections this response is insufficient to defeat the invading organism, and though it is easy to say that the resistance of the body has become weakened, such a statement explains nothing and affords no clue to the means of helping the body to victory.

It is impossible to assume that the reactions of the body to an infecting organism are limited merely to the mechanical mobilization of pre-existing cells and chemical substances. Both cells and antibodies are the end-products of other processes, for they must originate from some definite source, since neither is capable of reproduction in the blood stream. It is therefore behind these end-points of immune reaction that we must search for a clue to the failure of somatic response in chronic infections. Where the infection is of long standing, it is necessary materially to increase the rate of production of the leucocytes, and it cannot be assumed that the leucocyte-producing tissues alone of the body cells commence a proliferation due directly and entirely to the incidence of infection. Some means must therefore be found of stimulating certain tissue functions, and so the problem at once assumes a nutritional aspect. It may be recalled that the usual means of combating disease is by "keeping up the patient's strength"—that is to say, by decreasing tissue breakdown as far as possible by keeping the patient at rest, and by giving a nourishing diet; for many years therefore the basis of treatment of infections has been essentially the conservation of tissue energy.

THE SYMPATHETIC RESPONSE TO DISEASE.

The non-volitional activities of the body—and among them immune reactions must be reckoned—are for the most part under the control of the autonomic system, and closely associated with the latter is the group of endocrine glands. Through the agency of this double system the metabolic tone of the body is kept at a standard level, which is recognized as the physiological normal, and since metabolism and resistance are so closely related it is not unreasonable to turn to this system in search of the cause of failure of the body to react to infective processes. The autonomic system and its associate glands are generally divided into two groups—the thoracico-lumbar or sympathetic system, with which are associated the thyroid, suprarenal, and pituitary glands; and the cranio-sacral or parasympathetic system, to which are conjoined the pancreas, the parathyroids, and perhaps the thymus. If now we consider the symptoms of an acute infection it is not difficult to see which of these two systems becomes first affected. Acute infection is accompanied by fever, tachycardia, shivering, sweating, increased metabolism, and hyperglycaemia; all these are signs of overaction of the sympathetic nervous system, and they may also be produced in some degree by overaction of the thyroid gland. If these symptoms are perpetuated the picture of a chronic wasting febrile disease is presented, and may be exemplified by the later stages of phthisis. The tendency of this syndrome is towards death, since the rate of katabolism is greater than that of anabolism, and therefore we find that the general treatment of such conditions has been by rest and adequate nutrition, the indirect method of increasing resistance by limiting tissue breakdown.

There is another biochemical sign in acute infections which is of importance—it is the loss of calcium from the body; it has been recorded by a considerable number of observers and in a wide variety of diseases. There is evidence that this also is a sign of sympathetic overaction, for it may be produced by hyperthyroidism, while the parathyroid glands, which belong to the opposing system, are the regulators of calcium metabolism. I have observed disturbances of calcium metabolism in ulcerative conditions, and it has been shown that if the calcium deficiency which occurs is rectified by means of parathyroid administration the ulcer will also heal, the two processes running concurrently. Bruning and others consider that "trophic ulceration" is due to sympathetic overaction, and that while hypersympathicotonia leads to tissue degeneration and necrosis, vagotonia leads to tissue regeneration and repair. On these lines they treated a series of cases of varicose ulcer by periarterial sympathectomy and obtained satisfactory results. To sum up: the signs of sympathetic overaction include fever, tachycardia, sweating, hyperglycaemia, calcium loss, and a tendency to ulceration. All these are clinical signs of acute infection with the exception of the last, which, however, often appears in chronic infective states.

The acute infection has so far been considered, but it is easy to imagine a condition of less severity in which the symptoms are less marked and in which the infection is less acute. There may only be a low degree of fever, barely perceptible tachycardia, and yet the diagnosis of infection can often be proved bacteriologically. In such conditions some degree of hyperglycaemia and a decreased content of active calcium in the serum may be found, so that signs of sympathetic overaction are still present. We have now arrived at the picture of a chronic infection in which a low-grade sympathetic overaction is present, but yet in which the sympathetic function is greater than in the normal subject. For instance, in chronic nephritis there may be no clinical signs of sympathetic overaction, and yet calcium loss and hyperglycaemia have been frequently recorded.

Bacterial infection tends therefore to the disturbance of the balance between the sympathetic and the parasympathetic systems, the effect of the latter being outweighed by that of the former. If this be translated into terms of the endocrine glands, we may say that the thyroid overacts and submerges the action of the parathyroid glands. Examples of this antagonism are not uncommon, and it is frequently found that where a case is making progress on parathyroid therapy, the exhibition of thyroid substance will lead to retrogression.

THYROID FUNCTON AND RESISTANCE.

It is quite clear that in infection the sympathetic system is first affected and that its main activity is an acceleration of metabolism together with increased efforts of elimination. This action cannot, however, be regarded as a purposive one, but it is more in the nature of an irritative effect by the bacterial toxins upon the sympathetic system. The question may even be raised whether the febrile response is of real assistance, and here the phenomena of immunizing animals may be of value. Sestini observed that the thyroid gland of guinea-pigs showed signs of hyperplasia and intense cellular activity during immunization against *B. typhosus*. Kepinow and Metalnikow experimented upon the tuberculin reaction in guinea-pigs and found that the febrile response was closely connected with the thyroid gland since thyroidectomy prevented its occurrence; removal of the thyroid did not, however, prevent the guinea-pigs from dying.

There is apparently no relation between the degree of febrile response which follows a vaccine injection and the degree of immunity thereby established, and it becomes questionable whether the febrile reaction is an advantage or the reverse. The results of the injection of a full dose of vaccine are parallel to a mild acute infection in regard to the clinical and biochemical signs, and in both instances

a negative phase of resistance is produced. The time of occurrence of the negative phase is coincident with that of the sympathetic response; in an acute infection vaccine therapy in the acute stage may have serious consequences, and an acute infection supervening in the negative phase after vaccine injection may be equally dangerous. There is no proof that thyroid overaction produces either maintained leucocytosis or favours the production of antibodies; such evidence as there is points to an opposite effect. It appears that the febrile response to infection has but little real value, except that it may aid in the elimination of a certain amount of toxic material by increasing the blood supply to the eliminative organs. It is also of interest to note that fever is usually regarded as a sign of danger and not of protection, that efforts are made to reduce it, and that the favourable course of disease is judged largely by the diminution of the intensity of the fever. Much has been written concerning the action of the thyroid as a "detoxicating organ," and though the statements are usually of a vague and indefinite character, there seems to be a gradually growing idea that the destruction of toxic substances occurs actually within the gland. No satisfactory proof of this theory has ever been forthcoming, and there is no evidence that thyroxin or thyroid gland can destroy toxic substances *in vitro*. The theory seems to be based largely on the hypertrophy of the thyroid in infections and in pregnancy, but the possibility does not seem to have been considered that such hypertrophy may be a reaction to chronic irritation, just as any other tissue may hypertrophy under similar conditions.

Parasympathetic Function.

Chronicity of infection may therefore be due in part to a continued overaction of the sympathetic system, and a simultaneous depression of parasympathetic activity which may be relative or absolute. It must also be remembered that the endocrine glands may suffer direct damage in disease and that their function may therefore be interfered with; in addition the function of the parasympathetic glands may be further affected by the thyroid hypersecretion. That such damage may be done to the parathyroid glands is shown by the not infrequent occurrence of tetany in acute and chronic toxic conditions. The function of the parasympathetic system is essentially towards the conservation of tissue energy, whereas that of the sympathetic is to accelerate metabolism even to the ultimate destruction of life. Normally these two systems are in equilibrium, and it seems reasonable to suppose that when this balance has been upset by infection one method of inducing adequate resistance to the disease will be to restore the endocrine balance to its normal state. It has already been pointed out that the sympathetic response to a vaccine injection does not produce a high degree of immunity, and that it is not until the sympathetic response is over that immunity becomes established. The injection of dead organisms limits the extent of the sympathetic response in point of time, but where an infection is present it is probable that the continuous irritation of the sympathetic system prevents, or at least delays, the re-establishment of the normal sympathetic-parasympathetic balance.

Parathyroid Function and Resistance.

If this view of chronic infection is correct, the reasonable method of dealing with the condition is by increasing the parasympathetic function. If we regard the balance between the sympathetic and the parasympathetic as being represented by the balance between thyroid and parathyroid, then the means of counteracting thyroid overaction would be by parathyroid administration. The susceptibility of animals to infection after parathyroidectomy is well known; in common with other observers I have found that parathyroid therapy is of value in a wide variety of chronic infective states. In such different conditions as varicose ulcer, rheumatoid arthritis, and sprue, among others, it has been shown that an increase of the parasympathetic element by parathyroid therapy leads to a marked improvement. In such differing states there can be no question of any specific action of the preparation used upon the infecting organism, and it is evident that the phenomena of resistance to disease lie deeper than the leucocyte and the antibody. Moreover, I have found that where a chronic infection is present and where the leucocyte count is low, the administration of parathyroid substance has led to a considerable increase in the leucocyte count, indicating an effect upon the leucocyte-producing tissues. Similar effects, but of a less decided character, may be obtained by the injection of soluble calcium salts, and this supports the statement that calcium loss is one of the signs of sympathetic overaction. It is of interest to note in this connexion the powerful action of ultra-violet light upon disorders of calcium metabolism such as rickets, and also the curative effect of sunlight on such chronic infective states as tuberculosis. One might conjecture that ultra-violet light has a depressant action upon the sympathetic system or that it stimulates the parasympathetic.

Endocrine Balance.

It seems, therefore, that the problem of chronic infection resolves itself into the problem of equilibrium between the sympathetic and the parasympathetic systems, represented by the thyroid and the parathyroid glands respectively. It is not difficult on these lines to understand the incidence of chronic sequelae after acute infections, although the acute attack has apparently been overcome successfully and though the sequelae may be remote in point of time. The endocrine balance which was disturbed in the acute attack has never in reality returned to normal; a new equilibrium has been established on a different level which will still permit of an apparently normal existence. This new balance contains a sympathetic element greater than the normal, and signs of hyperthyroidism after severe illness are not uncommon. The patient is therefore left with a degree of parasympathetic deficiency and its accompanying susceptibility to infection. This is the condition which has been called "latent tetany," though a better term would be "chronic parathyroid insufficiency."

To recapitulate: the immediate response to infection, just as to physical attack, is an overaction of the sympathetic system. If the severity of the infection is of such a degree that it can be immediately overcome by the existing defences, there are no further ill results. If, however, the invading organism is not rapidly destroyed, the sympathetic irritation is continued and recovery does not take place or is long delayed; the condition becomes chronic, for under the existing condition of sympathetic overaction the resistant powers present at the onset of infection are not adequately reinforced. But if the activity of the parasympathetic can be stimulated, the re-establishment of the normal balance between the two systems permits recovery. As the body is kept in health by the normal balance between sympathetic and parasympathetic, so must this balance be re-established at the normal level for recovery to occur from an illness by which it has been disturbed.

Such a conclusion must lead to the consideration of all infective states on a similar basis, since the major phenomena of resistance to disease are not specific to the infecting organism in any sense of the word. The body reacts to all infections of equal severity in the same way—namely, by those phenomena which are collectively termed inflammation—and the only substances which are specific to the infecting organism are the antibodies. There is no evidence that these substances are produced to any great extent by the immediate sympathetic response, and experimental evidence suggests that thyroid activity does not facilitate their formation. They are a later development; in immunizing animals they appear after the negative phase at a time when the balance between sympathetic and parasympathetic is being restored. The leucocytes and the antibodies are not themselves necessarily affected by the disturbance of endocrine balance; the effect is upon the tissues as a whole, and therefore includes the sites of leucocyte production. In disease the body must be regarded as an organism with limited means of reaction, and it is those factors which control the physiologically normal state which will afford a clue to the control of abnormal or pathological conditions.

Conclusion.

The rationale of parathyroid therapy is therefore simple; it is a means of re-establishing the normal endocrine balance of the body, which infection has disturbed. Emphasis is

laid on the point that the balance between sympathetic and parasympathetic must be brought back to normal level; adequate resistance to disease is not a function either of the sympathetic system or of the parasympathetic system, but of the equilibrium between them. Disease may occur equally when either system is overacting at the expense of the other, and it is probable that the great success of prophylactic vaccination as compared with the more meagre results of curative vaccination may depend on the fact that in the former case the subject is healthy and is in a state of endocrine equilibrium, whereas in the latter case other conditions prevail. Any tissue performs its functions best when under physiologically normal conditions, and it cannot be supposed that the tissues which are concerned in the mechanisms of defence are exceptions to this rule.

EPIDEMIC HICCUP AND ENCEPHALITIS LETHARGICA.

Report of a Case of Epidemic Encephalitis showing Lethargy, Cranial Nerve Palsies, Myoclonus, and Hiccup,

BY

W. RUSSELL BRAIN, M.A., B.M., B.Ch.Oxon.,

HOUSE-PHYSICIAN TO THE MEDICAL UNIT, THE LONDON HOSPITAL.

THE purpose of this communication is to report a case of epidemic encephalitis exhibiting in one individual many of the varied manifestations of this protean disease.

M. M., aged 16, a healthy-looking well developed girl, was admitted to the London Hospital on July 18th, 1923. The mother says she had St. Vitus's dance as a child. In November, 1918, she had an acute illness. She was in bed a week with severe headache, sleepy all day but restless at night, and delirious for a day or two. She did not complain of visual impairment or diplopia at that time. Drooping of the right eyelid was noted by the doctor who attended her, but the mother said it has been present since infancy, and this is corroborated by photographs. She made a good recovery. This was possibly a previous attack of encephalitis.

Three months before admission she began to have attacks of hiccup two or three times a week; the attack would last a few minutes and then stop spontaneously.

Two months before admission she became acutely ill with severe headache. She slept all day, was hard to rouse, and became "a little light-headed at night." She vomited several times and the temperature is said to have been 104° F. She was in bed two days, and on getting up found that objects looked blurred, and she saw double, and has done so ever since—has felt languid and has had occasional attacks of hiccup as before.

Eight days before admission an attack of hiccup began which continued until admission; and she did not sleep at all on the previous night. The mother states that the patient has been always rather excitable, but more so since her illness two months ago.

Condition on Admission.

Mental State.—On admission she was restless, excitable, and talkative; smiling and laughing during examination. In spite of having hiccupped persistently for eight days she was apparently in no way depressed or fatigued by her condition, but, on the other hand, was rather amused at it; she was able to give an intelligent account of her illness; and her memory was unimpaired. Her mental state was thus similar to that of the myoclonic cases described by Ellis, though the excitement was less extreme and there was no delirium.

Hiccup.—When admitted she was hiccupping about 120 times a minute. Synchronous with each contraction of the diaphragm was a relaxation of the musculature of the abdominal wall and a sharp dilatation of the alae nasi. The frequency of the hiccup was diminished during speech, but it was not completely inhibited and often cut short a word; laughter caused a similar partial inhibition. She complained of a sensation of stiffness around the lower ribs. The hiccup ceased as soon as she was given a hot bath, within two hours of admission, and before she had had any sedative drug.

Myoclonic movements occurred in the upper limbs and the abdominal walls, but have never been very marked. In the upper limbs there were slight jerking movements of flexion of the elbow, wrist, and fingers, and pronation of the forearm occurring every few seconds. In the abdomen even before the hiccup ceased slight twitches of the abdominal muscles were seen, which did not occur so frequently and did not synchronize with it. When the hiccup ceased it was possible to examine these movements alone. They occurred seven or eight times a minute almost entirely in the upper abdomen and chiefly in the upper right quadrant, the umbilicus being drawn sometimes straight upwards, but usually obliquely upwards and to the right. The movements were associated with a weakness of the upper abdominal wall for voluntary movement, the umbilicus moving downwards when the head was raised from the pillow against resistance. The abdominal reflexes are of interest; the response in the right upper segment was very brisk as compared with the reactions in the other segments, and consisted of a sharp primary twitch, followed by a series of smaller twitches occurring at irregular intervals for several seconds. The reflexes on the left side and in the lower segments on the right side were normal. The myoclonic movements were thus associated with an increased reflex excitability of the same segment of the abdominal wall.

Cranial Nerves.—The fundi were normal, vision was unimpaired, and the visual fields normal. Photophobia was present, with a reflex spasm of the orbicularis oculi on illuminating the homolateral eye. The pupils were somewhat dilated, equal and regular. There was an extremely sluggish and unsustained reaction to light and on accommodation, but a slightly brisker response on convergence, which was poorly carried out. There was a slight weakness of the external rectus on each side with a corresponding convergent strabismus and diplopia on extreme lateral fixation to either side. Slight ptosis of right eyelid. No nystagmus. The uvula was drawn to the right on phonation. The other cranial nerves and the remainder of the nervous system showed no abnormality.

Condition One Month after Admission.

She had had no recurrence of the hiccup (August 15th), but was still abnormally sleepy at times, and occasionally complained of pain behind the eyes. The mental excitability was less pronounced, but the myoclonic movements were slightly more marked. Involuntary elevation of the eyebrows and blinking of the eyes were noted, while, in addition to the movements described before, occasional contractions were observed in the sterno-mastoids, the pectorales, the small muscles of the hands, and both quadriceps extensors; flexion and extension of the toes also occurred. The abdominal movements were unchanged; there was some flattening of the right upper segment on raising the head against resistance; the abdominal reflexes were brisker on the right than on the left, especially in the right upper segment, where the response still consisted of a series of three or four successive twitches. The cranial nerve palsies were less marked. The response of the pupils to light was brisker, as was also the reaction on convergence. The reaction on accommodation was still sluggish and ill sustained. Photophobia was still present. The weakness of the external recti was extremely slight, there being now no obvious strabismus, and only slight blurring of the image on extreme lateral fixation to either side. The slight ptosis of the right eyelid was unchanged.

When in 1917 von Economo first described the condition the well known lethargic type of the disease, with somnolence, lethargy, and ocular palsies leading to ptosis, strabismus, and pupillary disturbances, greatly predominated. Later it began to be realized that the manifestations were much more varied and widespread. The occurrence of cases closely resembling paralysis agitans began to attract attention, and still later the excited and myoclonic and choreiform types of the disease and the occurrence of epidemic hiccup became recognized.

In the excited and myoclonic patients and in epidemic hiccup the lethargy so typical of the more ordinary forms of the disease is replaced by mental excitement, delirium, and insomnia. Cases in which myoclonic movements were present occurred sporadically in 1918, but it was not until the end of 1919 that they became prevalent. They were described as a form of acute epidemic encephalitis in January, 1920, by Sicard and Kudelski, and Ellis[1] reported three cases in this country in that year. The characteristic of this variety is the occurrence of twitching of the muscles of the limbs, and rhythmic shock-like movements of the abdominal muscles, which may be so severe as to shake the bed with each contraction. Cranial nerve palsies may or may not occur.

Although cases of hiccup were noted by von Economo in 1917, hiccup did not occur in epidemic form until the end of 1919, when an outbreak coincided with the epidemic of the myoclonic form. Hall[2] quotes Boyd as describing an outbreak of epidemic hiccup which occurred in Winnipeg in the autumn of 1919, and preceded an outbreak of the lethargic form of the disease. The same authority quotes Dargein and Plazy, who describe a case in which lethargy and ocular palsies developed a fortnight after recovery from an attack of epidemic hiccup. But Hall concludes that "at the present time no dogmatic statement of the relationship of the two conditions seems warranted."

Conclusion.

The above case, therefore, is of interset. The patient after suffering for a month from intermittent brief attacks of hiccup, developed a typical though mild attack of the lethargic form of encephalitis with ocular

palsies. Two months later, after further brief attacks of hiccup, an attack of hiccup developed which lasted eight days, and for which she was admitted to the London Hospital. On admission she exhibited cranial nerve palsies, hiccup, and also myoclonic movements of the arms and abdominal wall. This would seem to establish finally the relationship between epidemic hiccup and epidemic encephalitis.

It is therefore not surprising that the epidemics of hiccup and myoclonic encephalitis should have coincided in 1919, since hiccup is probably a myoclonus of the diaphragm. In this patient as in the case recorded by Dargein and Plazy the hiccup preceded the development of the lethargic symptoms.

A further point of interest is the occurrence in this patient of an acute illness with lethargy and delirium in November, 1918. If, on the rather scanty evidence obtainable, this be accepted as a previous attack of epidemic encephalitis, the present illness must be regarded as a recurrence of the disease after the long interval of four years and six months.

It will be seen that in this one patient the majority of the varying types of this interesting disease are apparent and that the history of the individual reproduces more or less accurately the history of the development of our knowledge of epidemic encephalitis.

REFERENCES.
[1] Ellis, A. W. M.: *Lancet*, 1920, ii, 114. [2] Hall, A. J., Ibid., 1923, i, 731.

British Medical Association.

PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, 1923.

SECTION OF DISEASES OF CHILDREN.

EDMUND CAUTLEY, M.D., F.R.C.P., President.

DISCUSSION ON SUMMER DIARRHOEA.

OPENING PAPER

BY

DAVID NABARRO, M.D., F.R.C.P.LOND.,
Director of Pathological Department and Bacteriologist, Hospital for Sick Children, Great Ormond Street, W.C.

SINCE the early days of scientific bacteriology many investigators have paid attention to the micro-organisms present in cases of summer diarrhoea with the view of isolating the causal agent. Some of the earliest investigations are of little more than historical interest, inasmuch as the differentiation of allied forms as we now know them was in its infancy. I have not the time or space at my disposal to give you a detailed account of all the investigations which have been carried out upon this subject, so shall content myself by giving a summary of the findings of previous investigators.

Booker and Escherich were among the first to study the flora in intestinal disease, but they did not find a specific organism for diarrhoea. Amongst the organisms isolated by Booker were *B. coli communis*, *B. lactis aerogenes*, *B. proteus vulgaris*, and streptococci, any one of which Booker thought might play a part in the different types of the disease studied by him.

Klein in 1897 and 1898 isolated the *B. enteritidis sporogenes* from a small number of cases and regarded it as the causal organism of summer diarrhoea.

It was about this time (1898-1900) that Shiga, Kruse, and Flexner discovered the bacillus of dysentery, and in 1902 Duval and Bassett isolated dysentery bacilli from 42 out of 53 cases of infantile diarrhoea. These authors come to the conclusion that the dysentery bacillus "is an important, if not the most important, cause of summer diarrhoea in children." In 1903 the Rockefeller Institute undertook, under Dr. Flexner's direction, a comprehensive investigation in several large American cities on the occurrence of the dysentery bacillus in the summer diarrhoea and other diarrhoeal diseases of children. Dysentery bacilli were isolated in 63.2 per cent. of the 412 cases investigated. They were mainly of the Flexner-Harris-type, but the Shiga type was also met with, and occasionally the two types were associated. Other atypical forms were also isolated. Flexner, in his conclusions, stated that it is probable, though not proven, that *B. dysenteriae* appears at times among the saprophytic bacteria of the intestinal contents. He states also that streptococci in large numbers were frequently grown together with the dysentery bacilli, but that the relative parts played by each in the production of the intestinal lesions and the symptoms of the disease is not established by the investigation. Nor is the possible action of any other of the many bacteria of the discharges excluded by the special findings of this investigation. Other American observers, among them Wollstein, Park Collins and Goodwin, Duval and Schorer, Cordes, Weaver and Tunnicliffe, and Graham of Toronto, have reported epidemics associated with the dysentery bacillus.

In connexion with the frequent isolation of the dysentery bacillus by many American observers and its rarity in our English cases of the disease, attention must be drawn to the fact that the clinical types of summer diarrhoea as studied in the two countries appear to differ. In the American type of case the stools very frequently contained blood and mucus, and hence were more like the stools passed in true epidemic or asylum dysentery. In cases seen in this country the stools are variously described as green, slimy, watery or curdy, and offensive; blood is only occasionally present and mucus perhaps more frequently.

On the other hand, we find that Park Collins and Goodwin, and Schwarz in America, and Jehle and Charleton in Vienna, never isolated dysentery bacilli from cases of acute gastro-enteritis with the characteristic stools we are familiar with in this country. The last named observers considered that summer diarrhoea might be caused by various forms of micro-organisms of a non-dysenteric type, more particularly by *B. coli communis*.

In 1905 and 1906 Morgan studied the bacteriology of the disease in London children and isolated a considerable number of bacilli of the non-lactose fermenting type. These investigations were continued by Morgan and Ledingham in 1907 and 1908, and their presentation of the results obtained and the conclusions they drew from them to the Epidemiological Section of the Royal Society of Medicine in February, 1909, evoked an interesting discussion from epidemiologists and bacteriologists.

The outcome of the prolonged investigation was that a certain organism—Morgan's No. 1 bacillus—was proved to occupy a predominant position among the non-lactose fermenters in the excreta of summer diarrhoea patients. "In selected cases of the disease" it was isolated from 63 per cent. The strains isolated in 1905 and 1906 were pathogenic to young rats, rabbits, and monkeys by feeding; diarrhoea was produced, followed by death. The 1907 and 1908 strains were found to be much less pathogenic to animals by feeding.

Agglutination reactions with the serums of patients yielded far less satisfactory results than had been obtained by the American investigators. In 1905 Morgan found only one of the 44 serums tested agglutinating its own bacillus. In 1908 positive results were obtained in a larger proportion of the cases, 30 out of 65 cases tested giving a positive reaction with Morgan's bacillus, but the dilution in which the reaction was obtained never exceeded 1 in 40. The best results were obtained at or near convalescence.

Morgan's bacillus is a motile, small, Gram-negative organism which grows well on ordinary media, produces acid and a little gas in glucose and no change in lactose, dulcite, saccharose, or mannite. Litmus milk is unchanged in one and three days, but slightly alkaline on the fifteenth day. Indole is produced and gelatin is not liquefied. Morgan and Ledingham came across two variants of this type, both of which were non-motile and one of them not producing indole. It will be noted that the variant which was non-motile and indole-negative differs from Shiga's dysentery bacillus only by the production of a little gas in glucose media. Morgan himself, in his 1907 paper, draws attention to the fact that some of the properties of his No. 1 bacillus may vary—particularly the amount of gas produced from glucose. This, he says, may be so slight that

none shows in an ordinary Durham's tube. He notes, too, that the gas-producing power varies with age; after eighteen months' subculturing there may be no gas produced.

Another point from Morgan's and Ledingham's researches deserves attention. In addition to Morgan's bacillus and its two variants just referred to, no less than thirty-one other strains of non-lactose fermenters were encountered. These are grouped by the authors into seven types, which include a Flexner and a Gaertner type, each of which contains several strains and varieties.

The question of a filter-passing virus as the infecting agent was also considered in 1908. The blood and organs from three fatal cases of typical summer diarrhoea were extracted with salt solution and passed through a Berkefeld filter. Young cats were fed and rats inoculated with the filtrate, but with entirely negative results.

In 1907 Orr and his collaborators isolated from the heart blood, taken immediately after death from a fatal case of summer diarrhoea, an organism of the Salmonella type. It produced no change in litmus milk and no indole. It was pathogenic to the ordinary laboratory animals on injection and to puppies by feeding. In a later paper (1910) these investigators report that in course of time they found a gradually developing alkalinity in milk cultures and also that the bacillus formed gas from galactose, whereas on isolation it had formed acid alone. From 40 cases of summer diarrhoea they isolated this bacillus seventeen times, and they state that it was not once isolated from 100 healthy infants and children. They call it Bacillus "F," and consider that agglutinogenically it is related to *B. paratyphosus* B and *B. suipestifer*.

Next in point of time (1910-12) came the investigations of Lewis, Alexander, Ross, O'Brien, and Orr, under the auspices of the Local Government Board, to examine, amongst other points, the incidence of Morgan's No. 1 bacillus in healthy infants and children and in those suffering from diarrhoea; 919 normal children were examined in London, Birmingham, Liverpool, Manchester, and Shrewsbury, with the result that non-lactose fermenters were isolated from the faeces of 212 (23 per cent.). These organisms were of many different groups and varieties, the commonest being Morgan's No. 1 bacillus, which was isolated from 44 cases—about 4.8 per cent. Other non-lactose fermenters isolated from these normal cases were Gaertner's bacillus (Ross), Shiga's bacillus (Orr), and "dysentery-like" bacilli (Alexander). An interesting observation of these investigators, emphasized by Lewis, was that non-lactose fermenters were most often found in cases where cow's milk was an important item in the dietary, and when cow's milk was the sole diet such bacilli were rarely absent.

During these investigations (1910-12) 659 cases of summer diarrhoea were examined and non-lactose fermenters were obtained from 405—giving a percentage of 61.4. By far the commonest non-lactose fermenter encountered was Morgan's No. 1 bacillus (182 times); next comes Lewis's Group H (36 strains), then *B. paratyphosus* B and *Gaertner* (10), and *B. dysenteriae* (8). The remaining 169 non-lactose fermenters are distributed in various groups, subgroups, and varieties. Similar organisms were also isolated from milk, mice, and flies, so that it was concluded (1) that there are habitats for these organisms outside the human body, (2) that milk may serve as a vehicle, and (3) that other avenues may exist by which these organisms may gain access to the alimentary canal of children. Lewis (1914) after investigating the agglutination reactions of 242 strains of Morgan's bacillus, came to the conclusion that there are at least three main groups which can be thus differentiated, and that the strains isolated from normal children, from milk, and from mice may exhibit agglutination reactions identical with those of Morgan No. 1 isolated from diarrhoea cases. Logan in Edinburgh (1912) isolated non-lactose fermenters from 6 out of 21 normal children who were artificially fed. He did not find them in breast-fed infants. Morgan's bacillus was isolated twice; the others belonged to Lewis's groups H and J. In 14 cases of summer diarrhoea he met with Morgan's No. 1 bacillus 5 times, and from 3 others he isolated non-agglutinable dysentery bacilli. In one case numerous *B. proteus* were found. He records an interesting observation of "four cases all in the ward at the same time and three of them starting acute diarrhoea within a period of three days, in which the non-lactose fermenters isolated were different in each case."

We come next to the claims of *B. proteus vulgaris* as a cause of summer diarrhoea. It has already been mentioned that Booker assigned an important rôle to this organism in some of his cases. Jeffries and Baginsky also concluded that it played a part, but they do not suggest it as the sole cause. Most subsequent observers, too, have come across *B. proteus* in a certain small proportion of their cases. Metchnikoff and his school revived the suggestion of the causal relationship of *B. proteus* to summer diarrhoea. In 1914 he wrote thus: "*B. proteus* is the chief microbe in the diarrhoea of infants. We have found it in nearly every case of the disease we examined. Its pathogenicity when given by the mouth, either alone or in association with other microbes, demonstrates its preponderating importance." Several investigators, such as Levy and Thomas (1895), Vincent (1909), and Metchnikoff and Berthélot (1914), have shown that *B. proteus* seems to possess the power of increasing the pathogenicity of other organisms. Apparently in certain French epidemics of this disease *B. proteus* has been much more frequently found than in the cases studied in other countries.

Bloch (1911-18) reports the isolation of *B. proteus* in 52 out of 128 cases of acute gastro-enteritis and in 95 out of 244 cases of acute dyspepsia and symptomatic diarrhoea. Several pathogenic bacteria—paradysentery, paratyphoid, and, in one case, typhoid bacilli—were isolated, and Bloch concludes that acute gastro-enteritis in infancy is due to infection, but not to any specific infection.

During the war a large amount of work was done upon intestinal infections in the many military laboratories in Europe and elsewhere. Our knowledge of the pathogenic bacteria, particularly of those causally connected or associated with intestinal disorders, has hereby been considerably increased. For example, the dysentery group of bacilli received a large share of attention, and in consequence these organisms have been more thoroughly differentiated. We are particularly indebted to Andrewes and Inman for a clarification of our knowledge of the Flexner group of dysentery organisms. On the other hand, the investigations carried out during the war brought to light many more connecting links between the well established bacilli, to which such names, for example, as "para-Shiga, indole-positive" and "para-Shiga, indole-negative" have been given. C. J. Martin and others have drawn attention to the fact that the organisms of the Flexner group are very variable in their properties.

Personal Observations.

The summer of 1921 was very hot and dry, and one would have expected summer diarrhoea to have been very prevalent that year. Owing to the absence of some unknown factor or factors, we did not experience a severe epidemic, nevertheless a considerable number of typical cases did occur. My colleague Dr. Donald Paterson and I investigated 150 cases of summer diarrhoea and other conditions in which diarrhoea was a symptom among patients at the Hospital for Sick Children, Great Ormond Street. Unfortunately the labour entailed in making complete pathological and bacteriological investigations upon such a large volume of material proved too much for the assistance at our disposal, so that the bacteriological investigations we were able to carry out were not as complete as could be desired. Nevertheless, some interesting results were obtained.

The 150 cases studied were made up as follows: 111 cases of summer diarrhoea, of which 84 were fatal and 27 recovered; 36 cases of other diseases in which diarrhoea was a symptom; and 3 cases of nurses with diarrhoea. Bacteriological examinations were made (either during life or after death or both) upon 41 of the 84 fatal cases of summer diarrhoea, and upon the remaining 66 cases of the series—making 107 cases in all which were studied bacteriologically. Dr. Paterson has already described the clinical and pathological aspects in detail in a paper which was published in the *Lancet* (1922, vol. ii, p. 320). A few points brought out in that paper are worth recalling. The evidence of infectivity in our series of cases is slight. Of the 84 fatal cases, 45 were attacked when in a healthy

condition, and in 39 there was a history of previous digestive troubles; we call these cases "acute" and "chronic" respectively. The theory that the infection is conveyed in the milk did not receive much support from this series of cases. The curve of onset shows two maxima, one about the third to fourth week in July, and the other about the first week in September, as though there were two epidemics, as suggested by Brownlee.

In the "acute" cases there was usually a history of sudden vomiting and diarrhoea—the motions were green, slimy, and only rarely contained blood. On only one occasion was pus detected in the stools. In the "chronic" cases there were many watery, green, slimy, undigested stools which very rarely contained blood. The patients rapidly passed from the stage of "dehydration" to one of "intoxication," then became comatose and died. *Post mortem* the most important as well as the commonest lesion was a varying, and at times an extensive, degree of fatty change in the liver. The kidneys were similarly affected, but to a less extent. The intestinal lesions varied considerably in degree. At times the intestines appeared quite normal, at others there was a catarrhal enteritis and colitis with excess of mucus. Some cases showed definite ulcer formation, either small punched-out ulcers, or larger, shallow, irregular ulcers. The changes were more marked in the big bowel and particularly in the neighbourhood of the caecum; they included congestion, petechial haemorrhages, follicular ulceration, general thickening and induration or ulceration, and occasionally a definite membranous colitis.

The results of the bacteriological investigations are set out in the accompanying table. In it we see that no non-

Analysis of Diarrhoea Cases Investigated (1921).

Organisms Isolated.	Fatal Cases of Summer Diarrhoea.*		Non-fatal Cases of Summer Diarrhoea.	"Other" Cases of Diarrhoea.‡	Nurses (Two with Clinical Typhoid).	Totals.
	Acute.†	Chronic.				
No. of cases examined	22	19	27	36	3	107
B. coli anaerogenes ...	7	4	10	2	2	25
B. dysenteriae	2	1	3	7	0	13
B. typhosus	0	0	0	5	0	5
B. paratyphosus B—type, Indole-negative	1	1	0	0	0	2
B. paratyphosus B—type, Indole-positive	2	2	0	3	0	7
B. proteus vulgaris ...	0	2	0	4	0	6
Non-lactose fermenters isolated	14	9	14	19	1	57

* These cases were examined bacteriologically and *post mortem*, and are referred to in the paper by Dr. Paterson, with short bacteriological report by Dr. Nabarro (*Lancet*, 192 , ii, p. 320).

† Acute = apparently healthy children suddenly attacked by diarrhoea. Chronic = children with history of previous indigestion, diarrhoea, and failure to gain weight.

‡ These include cases occurring during summer and all cases of diarrhoea (including "D. and V.") occurring out of the season.

lactose fermenters were isolated in 57 of the 107 cases investigated. No doubt we missed these organisms in a certain number of the cases owing to the want of sufficient assistance to enable us to make repeat examinations of the faeces in the negative cases. The organism most frequently isolated (25 times out of 107 cases) was one which produced acid but no gas in the sugar and alcohol media used—glucose, mannite, lactose, saccharose, and maltose. It was generally non-motile, was Gram-negative and a non-liquefier of gelatin, formed acid and generally a clot in milk, and only rarely formed indole. It closely resembles, if it is not identical with, the *B. coli anaerogenes*, first isolated from the faeces of dogs, and described by Lembke in 1896. Several strains of the organism were met with in our cases. They all formed acid in glucose and mannite in one day; saccharose and maltose were acidified by some and not by others. In lactose acid was usually produced in one to three days, but sometimes not until the ninth day, and occasionally not at all. This variety, which apparently formed no acid in lactose, might quite well have been found by previous observers and labelled a "non-agglutinable dysentery bacillus."

As has been recorded so often by other investigators in the case of different organisms, so I have found to be the case here—namely, that the properties of the bacillus have changed after frequent subcultures. For example, several of the strains which in 1921 produced indole, now fail to do so, and one which did not form indole on isolation now does so. One strain forms acid in lactose on the first day, whereas in 1921 no acid was observed until the sixth day. On isolation the agglutination reactions with a dysentery Flexner-Y serum were kindly tested for me by Drs. Ledingham and Brooks of the Lister Institute. The results were all negative except in the case of one strain which agglutinated at 1 in 100 (it was not tested in higher dilution). I have since carried out a large number of agglutination reactions (which are, however, not yet completed) and have found hitherto that the only heterologous serums which agglutinate this group of bacilli are those of *B. coli communis* and the "Newport" and "Mutton" strains of *B. suipestifer*.

A few feeding experiments recently carried out on young rabbits have resulted in producing diarrhoea and death in some of the animals, from the heart blood of which I have succeeded in recovering the bacillus. This organism or group of organisms has not received much attention from bacteriologists. Alexander, in the reports already referred to (1911 and 1912), states that in 1911 he encountered them frequently, and in 1912 he paid particular attention to them. He isolated them from 7 out of 100 normal children and from 9 out of 77 diarrhoea cases. He describes 11 different varieties from his diarrhoea cases which produced acid and no gas in lactose, but only one which produced no gas in any sugar medium. From the normal children he isolated 5 different varieties, 3 of which produced no gas in any sugar. Fifty-nine strains were tested by feeding to young rabbits: 8 proved to be pathogenic—2 out of 8 obtained from normal children, 3 out of 26 from diarrhoea children, and 3 out of 25 obtained from other sources. He gives in his paper a list of the previously investigated acid producers: several were isolated and named by Castellani; others were isolated by Dr. Cox from flies in insanitary areas in Liverpool during the summer of 1911; others again were isolated by Gettings from cases of pseudo-dysentery at Wakefield. I had myself isolated it from a patient with clinical dysentery at the Wakefield Asylum early in 1912, and quite recently I have isolated a strain from a long-standing case of bacilluria.

Bainbridge, in his paper "On the paratyphoid and food-poisoning bacilli," 1909, describes a strain of *B. suipestifer* which never formed gas in any medium, and mentions that a similar strain of *B. suipestifer* was described by Bock in 1906.

Coming back to our table, it is interesting to note that the *B. dysenteriae* was isolated from as many as 13 cases out of 107. I have no doubt, from my eleven years' experience at Great Ormond Street, that infections due to the *B. dysenteriae* have been much more commonly met with in children since the war began than in the pre-war days. This is what one would expect from the large number of men who suffered from the disease, some of whom are no doubt carriers. The cases from which *B. typhosus* was isolated constituted a small group of 5 children and 2 nurses, who contracted the disease from a known source. The organisms I have called paratyphoid B type, indole positive or negative, are probably harmless intestinal organisms for which Savage has suggested the name of "para-Gaertner bacilli." Lastly, one must draw attention to the fact that Morgan's No. 1 bacillus was not isolated from a single case in 1921, though in previous years I had come across it in the children at Great Ormond Street, and in 1911 I isolated it eight times in association with other bacilli from about 50 cases of asylum dysentery at Wakefield.

In 1922 extensive preparations were made at the Great Ormond Street Hospital, under the auspices of the Medical Research Council, for a full investigation of summer diarrhoea, but unfortunately for the investigation very few cases of the disease occurred. While waiting for cases Dr. Marshall Findlay investigated the bacteriology of the stools

and the agglutinating properties of the serums of normal children chosen from the out-patient department of the hospital and from welfare centres. He has kindly furnished me with the following summary of his results: 304 investigations of the faeces or rectal swabs were made from 139 cases; in 13 cases organisms of the dysentery group were isolated, in only one of these, however, did the child's serum agglutinate the organism isolated; in 115 cases of normal children the agglutinating power of the serum was tested against *B. dysenteriae* Flexner, *B. enteritidis* Gaertner, *B. aertrycke* ("Mutton"), and Morgan's bacillus No. 1; 13 agglutinated *B. dysenteriae*, but never higher than 1 in 50, 3 the *B. enteritidis*, and 1 *B. acrtrycke*. In the 6 cases of summer diarrhoea studied, a specific *B. enteritidis* infection was found once, giving both a positive culture and agglutination.

Critical Review.

The one outstanding fact which emerges from the foregoing review of the bacteriology of summer diarrhoea is that in different outbreaks of the disease many different organisms have been isolated by the same observer or group of observers, and that at the same time one particular organism, be it a dysentery bacillus, a *B. proteus*, a Morgan's bacillus, or a *B. coli anaerogenes*, has been the organism most frequently met with. This suggests the first question we must endeavour to answer—namely, Is summer diarrhoea a single clinical entity like typhoid fever, or are there several diseases included under that heading? Certainly in some epidemics—for example, in America—the type of the disease has been more severe and more like clinical dysentery than has been the case in our English epidemics. But in our own cases we have found lesions of all grades of severity *post mortem*, yet clinically the types of the disease had been very similar. I believe myself that the disease is one and the same all the world over, and not an infectious disease in the strict sense of the term, but rather of a metabolic origin with a secondary infection by one of a number of different micro-organisms, which have for the time being, in a manner I shall suggest later on, become either more virulent than usual or pathogenic after being non-virulent. The diarrhoea and vomiting I regard as symptoms of that metabolic disturbance, and the consequent "dehydration" and "intoxication" as secondary effects of the loss of water from the system. This in turn gives rise to reduced elimination of toxic substances by the kidneys, reduced action of the liver owing to its fatty degeneration, and so a "vicious circle" is established.

There is no doubt that the Americans isolated dysentery bacilli from 63 per cent. of their cases, also that Morgan and Ledingham isolated Morgan's bacillus from 63 per cent. of their "selected" cases, but this does not prove that either organism is the actual cause of the disease. The French investigators isolated *B. proteus* from nearly all their cases, and in 1921 I failed to find Morgan's bacillus even in one case. Certainly in any one year or series of years one particular organism may be the predominant one, but it must be remembered that all observers have found many other forms, some allied to the dominant bacillus, others more remotely resembling it, if at all. I emphasize this point because it leads to the vexed and important question of bacterial instability and metamorphosis.

The essence of life is growth, change, and evolution. Presumably bacterial life dates from the Creation, but it is less than fifty years since it has been studied scientifically by modern methods. We know that bacteria grow and therefore may change and undergo evolution. A month or a year in the life of a micro-organism and its progeny may be equivalent to a thousand years in the case of man and the higher animals. As with the higher forms of life, bacteria undoubtedly respond to and are affected by changes in their environment—for example, heat and cold, diet, and, in the case of intestinal bacteria, the reaction and composition of the intestinal contents, other organisms (symbiosis), the presence of bacteriophages, and so forth. Possibly, too, bacteria may have their own diseases; they certainly have their enemies as well as their friends. There are undoubted signs that bacteria are changing their characteristics. Hiss, Neisser, Rodet, Massini, Twort, and Penfold have given instances of this in their writings on bacterial variation. A host of investigators have remarked that in studying the bacteria isolated from cases of diarrhoea and dysentery many different strains of bacilli have been present; either the sugar reactions varied, or their behaviour in milk, or their power of forming indole, and even their agglutinability.

Furthermore, it has been noted very frequently that under our very eyes, during a period of even a few months only, one or more of these properties of a particular organism may vary on subculture. If that is so, surely it is not too great a stretch of the imagination to ask you to believe that these very same changes may be going on in the intestine of the host in whom a bacillus may have effected a temporary or permanent lodgement? Take, for example, Morgan's No. 1 bacillus. Morgan himself says that Houston and MacConkey, both of whom are careful observers and had examined hundreds of strains of bacteria from sewage, waters, milk, etc., had never come across his No. 1 bacillus. All these observers used the same methods of investigation, and it is unlikely that it was overlooked by Houston and MacConkey—therefore it must be an "entirely new organism." I think this very improbable, and that it is much more likely to have been evolved from some other bacillus. Morgan says it is most like the bacillus of hog cholera; it is obviously not far removed from the Shiga bacillus. It is interesting to note that several observers (Bainbridge, Bock, Ten Broeck, Savage and Forbes) have recorded strains of *B. suipestifer* which have lost the property of forming gas from glucose and other sugars. It will be remembered that my strains of *B. coli anaerogenes* agglutinate with *B. suipestifer* serums. Perhaps the explanation is that the fashionable diarrhoea bacillus which in 1905-12 was the Morgan No. 1, in 1921 appeared in the form of *B. coli anaerogenes*, and by 1930 will have changed to something apparently different.

What evidence is there that these organisms, which are admittedly present in a large percentage of the cases of summer diarrhoea, are the actual causal agent? There is evidence both for and against this view. In favour of it we have their frequent occurrence in cases of the disease and the fact that the blood of the patients often agglutinates the bacillus, though frequently not in high dilution. Against this view is the fact that the same organism may be isolated from normal children and from flies in infected houses. During epidemic seasons the non-lactose fermenters have been isolated more frequently than in non-epidemic seasons. This is to be expected. During an epidemic the chances of direct infection, the infection of milk and other foods, either by the hands of mothers, or by soiled cloths, or by flies gaining access, are naturally greater than at non-epidemic times, especially if due provision is not made for immediate disinfection or disposal of the excreta or soiled napkins. The pathogenicity or otherwise of the isolated microbes for the lower animals also proves little, for (1) diarrhoea-producing and even fatal strains of Morgan's No. 1 bacillus and *B. coli anaerogenes* have been isolated from normal children, and (2) many strains from diarrhoea cases have not been pathogenic to animals by feeding.

While admitting, therefore, that these organisms may play a part in summer diarrhoea, I do not think they are the sole or even the principal exciting cause. I am inclined to agree with the dictum of Pfaundler, quoted by Liefmann, that in summer diarrhoea children sickened *ex alimentatione*, and that they died *ex infectione*.

If we admit (and much evidence in favour has been adduced) that most, if not all, of these bacteria may be harmless intestinal inhabitants, what conditions determine their conversion into harmful pathogenic agents? These I can give only very briefly as follows:

A. *Diminished Resistance of the Individual.*

1. General—from exposure to great and prolonged heat, undue and prolonged exposure to cold (Gettings found that many patients developed dysentery at Wakefield Asylum during the coal strike in 1912), malnutrition from underfeeding, improper feeding, and perhaps vitamins A and B underfeeding (Cramer).

2. Local—that is, in the alimentary canal.

   (*a*) Diminished acidity of the gastric juice allowing more swallowed bacilli to pass into the intestine.

(*b*) Irritation of the bowel by chemical "poisons" in milk or other food, or made locally—for example, tryptophane and other protein degradation products.

(*c*) Reduction in the numbers of the beneficent intestinal microbes, particularly the anaerobic acidophile or "acid-tolerant" bacilli which normally check the overgrowth of *B. coli* and allied forms. Possibly bacteriophages play a part in this process.

(*d*) Stunting and atrophy of the intestinal villi consequent upon underfeeding with fat-soluble vitamin A, whereby organisms are enabled to multiply enormously in the mucous glands of the caecum, as Cramer has recently shown.

(*e*) Increased formation of harmful acids as by *B. coli* and *B. welchii* leading to increased peristalsis and diarrhoea and a catarrhal or inflammatory condition of the bowel wall (Distaso).

B. *Increased Virulence of the Bacillus.*

1. "Mass action," whereby is meant the ingestion with the food of greatly increased numbers of the organism, which has multiplied owing to the temperature. The local overgrowth in the intestine just referred to would act similarly.

2. Increase of toxicity on account of passage through a former patient.

3. Symbiosis—for example, through association with *B. proteus* or other intestinal organism, possibly a filter-passing virus.

Two or more of these conditions may act together and I cannot help thinking that the primary cause of summer diarrhoea is to be found under this heading rather than in any one particular micro-organism.

In conclusion, I should like to convey my thanks to my assistant, Mr. Stanley Woodward, whose valuable help has enabled me to carry out all the work referred to in this paper.

BIBLIOGRAPHY.

Alexander, D. M.: Rep. M.O. Local Government Board, 1912, App. B, No. 3, p. 288; Ibid., 1914, App. B, No. 4, p. 384.
Andrewes, F. W., and Inman, A. C.: Med. Res. Comm., Spec. Rep. Ser., No. 42, 1919.
Bainbridge, F. A.: *Journ. Path. and Bact.*, 1908, vol. 13, pp. 340 and 448.
Bloch, C. E.: *Ugesk. f. Laeger*, 1920, vol. 82, p. 745; Abstr. in *Med. Science*, vol. 4, April, 1921.
Bock: *Arb. a. d. kaiserl. Gesundheitsamte*, 1905, Berlin, vol. 4, p. 227.
Booker: *Trans. Internat. Med. Congress, Washington*, 9th ser., 1887, vol. 3, p. 538; *Johns Hopkins Hosp. Reports*, 1897, vol. 6, p. 159.
Brownlee, J.: *Proc. Roy. Soc. Med.*, 1909, Epidem. Sect., vol. 2, p. 243.
Cordes: *Proc. New York Path. Soc.*, 1903, n.s., vol. 3, p. 147.
Cramer, W.: *Lancet*, May 26th, 1923, p. 1046.
Distaso, A.: *Centralbl. f. Bakt. u. Paras.*, 1911, Orig., vol. 59, pp. 48 and 97.
Duval and Bassett: *Amer. Med.*, September, 1902, vol. 4, p. 417; Rockefeller Monograph (see under Flexner and Holt), 1904, p. 7.
Duval and Shorer: Ibid., 1904, p. 42.
Escherich: *Jahrbuch f. Kinderheilk.*, vol. 49.
Flexner, S., and Holt, L. E.: *Bacteriolog. and Clin. Studies of the Diarrhoeal Diseases of Infancy, from the Rockefeller Institute*, 1904; edited by Flexner and Holt.
Gettings, H. S.: *Trans. Soc. Trop. Med. and Hyg.*, 1914-15, vol. 8, No. 4, p. 111.
Graham, S. G.: *Canadian Med. Assoc. Journ.*, Toronto, 1921, p. 529.
Hiss: *Journ. Med. Research*, vol. 13, p. 36.
Houston, A. C.: Supp. to Report of the Medical Officer to the Local Government Board, 1903, p. 511.
Jehle and Charleton: *Zeit. f. Heilk.* (Abt. f. int. Med.), 1905, vol. 26, p. 402.
Klein, E. E.: Ann. Report of the Medical Officer to the Local Government Board, 1898, App. B, No. 1, p. 210; Ibid., 1899, App. B, No. 1, p. 312.
Lembke: *Arch. f. Hyg.*, vol. 25, 1896, p. 293; and vol. 27, p. 384.
Levy and Thomas: *Arch. f. Exp. Path. u. Pharm.*, 1895, vol. 35, p. 109.
Lewis, C. J.: Report of the Medical Officer to the Local Government Board, 1911, App. B, No. 2, p. 314; Ibid., 1912, p. 265; Ibid., 1914, App. B, No. 3, p. 375.
Liefmann: *Zeit. f. Hyg.*, 1909, vol. 62, p. 199.
Logan, A.: *Journ. Path. and Bact.*, 1914, vol. 18, p. 527; *Lancet*, 1916, vol. ii, p. 824.
MacConkey, A.: *Journ. Hyg.*, 1905, vol. 5, p. 333; 1906, p. 385; 1909, p. 86.
Martin, C. J.: BRITISH MEDICAL JOURNAL, 1917, vol. i, p. 479.
Massini: *Arch. f. Hyg.*, vol. 61, p. 250.
Metchnikoff, E.: *Ann. de l'Inst. Pasteur*, 1914, vol. 28, p. 80.
Metchnikoff and Berthélot: Ibid., 1914, vol. 28, p. 132.
Morgan, H. de R.: BRITISH MEDICAL JOURNAL, 1906, vol. i, p. 908; 1907, vol. ii, p. 15.
Morgan and Ledingham, J. C. G.: *Proc. Roy. Soc. Med.*, 1909, Epidem. Sect., vol. 2, p. 133.
Nabarro, D.: *Lancet*, 1922, vol. ii, pp. 325 and 382.
Neisser: *Centralbl. f. Bakt.*, Abt. 1, Ref., vol. 38, Beilage, p. 98.
O'Brien, R. A.: Report of the Medical Officer to the Local Government Board, 1911, App. B, No. 4, p. 367.
Orr, T.: Ibid., No. 5, p. 374.
Orr, S. Williams, and others: *Lancet*, 1909, vol. i, p. 301; and 1910, vol. ii, p. 730.
Park Collins and Goodwin: *Proc. New York Path. Soc.*, 1903, n.s., vol. 3, p. 168.
Paterson, D.: *Lancet*, 1922, vol. ii, p. 320.
Penfold: *Journ. Hyg.*, 1911, vol. 11, p. 30; *Proc. Roy. Soc. Med.*, Path. Sect., 1911, p. 97.
Rodet: *De la Variabilité dans les Microbes*, 1894.
Ross, S. M.: Report of the Medical Officer to the Local Government Board, 1911, App. B, No. 3, p. 347.
Savage, W. G.: *Food Poisoning and Food Infections*, London, 1920; Report of the Medical Officer to the Local Government Board, 1906 to 1910.
Savage and Forbes: *Journ. Hyg.*, vol. 17, p. 450.
Schwarz: *Proc. New York Path. Soc.*, 1903, vol. 3, p. 172.
Ten Broeck: *Journ. Exp. Med.*, 1916, vol. 24, p. 213; and 1917, vol. 26, p. 437.
Twort: *Proc. Roy. Soc.*, London, 1907, Ser. B, vol. 79, p. 329.
Vincent: *Bull. de l'Acad. de Méd.*, 1909, vol. 62, p. 338.
Weaver and Tunnicliffe: *Journ. Infec. Dis.*, Chicago, 1905, vol. 1, p. 70.
Wollstein: *Journ. Med. Research*, Boston, 1903, vol. 10, p. 11; Rockefeller Monograph (edited by Flexner and Holt), 1904, p. 193.

DISCUSSION.

Dr. DONALD PATERSON (London) said that of the vast group of cases which suffered from diarrhoea in summer time, only a comparatively small proportion were severe enough to become in-patients at a hospital. Of the cases admitted to hospital possibly one-half to three-fourths died, depending on the length of their illness before admission and the gravity of their condition on admission. Of those cases which died and came to *post-mortem* examination, less than one-half showed any pathological lesion in the bowel wall, and from even those which did show ulcers or erosions of the mucous membrane an organism pathogenic to man could be obtained in only a small proportion of cases. Blood and mucus in the stools of cases of summer diarrhoea was an extreme rarity in this country and was taken in America as the criterion on which to diagnose clinically between an infective and a so-called fermentative diarrhoea. In more than one-half of the fatal cases of summer diarrhoea, therefore, there was no pathological or bacteriological evidence of infection by an organism pathogenic to man. It might safely be assumed that of the vast number of cases that recovered the majority had not been infected by an organism pathogenic to man. They had not been suffering from an ileo-colitis, for it was noted constantly in hospital that this type of case was uniformly fatal. The question then arose, what was the cause of the diarrhoea in those children who succumbed showing no pathological lesion in the bowel or other organs, and in those children who had completely recovered from their attack of diarrhoea? This group comprised by far the greatest proportion of the whole of the cases of diarrhoea in summer time. An analysis of the case-histories, especially from the feeding standpoint, would lead one to believe that in this direction lay the main fault. At least one-half of all these cases had a history of unsatisfactory feeding and mismanagement. Prior to the onset of their illness they were suffering from malnutrition or marasmus; their stools were loose and contained partially digested food elements even in cold weather. On the advent of warm weather this condition of indigestion was exaggerated merely, and they passed into a state which was indistinguishable clinically from a case of true infective diarrhoea. The other half of this group were as a rule at the other extreme as regards nutrition. They comprised the fat, overfed infants who were putting on weight rapidly and whose digestive organs were being pushed to the extreme limit to handle the food offered them. With hot weather those children developed an acute attack of dyspepsia which manifested itself by diarrhoea and vomiting—nature rebelling against too much food. This might occur on artificial food or even on breast milk. Starvation in an infant of that type was badly borne and quite quickly it developed the condition known as "acidosis." In these cases *post-mortem* examination revealed only an extreme fatty change in the liver. This group, in which there was no pathological or bacteriological evidence of infection by an organism pathogenic to man, had been termed "fermentative diarrhoea," or diarrhoea due to "auto-infection." Whether they were really suffering from auto-infection by the normal organisms of the bowel or whether their condition was due to an exaggeration of the fermentative action of the bowel organisms during the warm weather was difficult to prove. Certainly a diet which tended to reduce fermentation in the bowel seemed to suit them better than any other which he had found. In Dr. Paterson's opinion the large proportion of cases of diarrhoea in this country were due to a primary dietetic error, which was easily produced in hot weather and owing to the tendency for children to be overfed. Possibly increased fermentation of the carbohydrate portion of the diet due to an overgrowth of the bowel organisms took place and exaggerated this dyspepsia. The main proof of that rested on the beneficial effect of a diet in which fermentation was reduced to a minimum.

The PRESIDENT (Dr. Edmund Cautley) said that Dr. Nabarro had raised many interesting points. It was especially interesting to hear that he did not consider summer diarrhoea as infective. But if Dr. Nabarro

thought typhoid was infective, why not diarrhoea? In his hospital the cases were nursed like typhoid, but even so the disease was occasionally carried from one child to another in a ward. He thought that this was due to the organism being conveyed by flies. Some of the worst toxaemic cases he had seen had started in well nourished children. In them a predisposing state of nutrition did not seem to have had anything to do with it. He considered the disease as infective, but thought that many different organisms were involved. There were several types of cases and the treatment must be different in each. In fermentative diarrhoea it was enough to cut off the sugar and fat. A profuse, watery, green stool indicated infection by proteolytic organisms. Albumin water was then the worst thing that could possibly be given; in any case it was a pernicious panacea and should be abolished. The best treatment was to give water only, or weak sugar solution, such as 5 per cent. lactose; Horlick's milk, which was very deficient in protein and fat, might be of advantage. In proteolytic diarrhoea he encouraged the free growth of lactic acid bacilli. He did not use whey; babies fed on whey developed green stools after a time because of the organisms it contained.

Dr. BERNARD MYERS (London) said that he had been astonished to find so many cases of summer diarrhoea in which nothing pathological was found at necropsy. He thought that clinicians often included various forms of diarrhoea under the term "summer diarrhoea." He believed that Finkelstein's classification gave a much clearer conception of what was usually understood by summer diarrhoea than any other, but it was necessary to differentiate his state of dyspepsia from intestinal intoxication, which corresponded to ordinary summer diarrhoea. Dr. Myers believed that hot weather, unsuitable or affected food, unhygienic conditions, previous ill health, etc., were all able to play a part. Too much carbohydrate and fat appeared to be especially at fault. Too strong wheys or other causes might affect the bactericidal action of the mucous membrane and allow bacteria to pass up in great numbers from the large to the small intestine, causing formation of acetic and butyric acids, etc., which probably gave rise to increased peristalsis of the bowel, and allowed toxic absorption. He gave water during the first six to twelve hours and then either protein milk, diluted skimmed milk, or diluted whey with small amounts of boiled skimmed milk. The giving of sufficient fluid by mouth or injection of gum saline solution intravenously was essential. Camphor (gr. 1/4) was often called for hypodermically.

Dr. CATHERINE CHISHOLM (Manchester) said that different speakers had been referring to different types of cases; Finkelstein's work had been of great help in treatment. But, apart from the cases caused by summer heat or defective nutrition, there was an infective group. Children in the country, even under bad conditions, did not get epidemic diarrhoea. Treatment must be given along the lines indicated in each particular case. The decline of the disease was due to welfare work and to the care taken in cities to prevent the spread of infection. It was obvious, therefore, that infection through micro-organisms of varying character must be the cause of the disease.

Dr. E. P. BAUMANN (Johannesburg) said he had listened with interest and benefit to Dr. Nabarro's paper, which excellently summarized modern views with regard to the nutritional rather than bacterial origin of diarrhoeal disorders in infancy. Although he himself believed that certain forms of infant diarrhoea were primarily bacterial in origin, it was nevertheless safe to treat all forms of this disorder upon a nutritional basis. If this were done attention would be concentrated upon dietetic measures to the exclusion of the use of drugs, vaccines, and other forms of treatment, which were generally useless and occasionally harmful. Except in very early cases he deprecated the institution of periods of starvation. The child had usually been subjected previously to such periods, and further starvation might easily convert the case into one of decomposition in which all further treatment was hopeless. In mild cases he had found that mere dilution of the previously administered milk mixture would suffice, especially if sugar or lactose additions were replaced by a less fermentable carbohydrate such as one of the dextro-maltose preparations. In somewhat severer cases protein additions must be made to the mixture. In very severe cases the use of Finkelstein's albumin (or protein) milk was indicated. The use of this preparation in his hands had robbed infant diarrhoea of most of its terrors. It was necessary, however, when employing Finkelstein's albumin milk to make carbohydrate additions to the mixture from the very outset, lest the diarrhoea be cured and the patient succumb to inanition.

Dr. G. BRUTON SWEET (Auckland, New Zealand) suggested the use of skimmed milk powder as a means of treatment in cases of summer diarrhoea. He had used it for many years in New Zealand, and had found it entirely satisfactory. It was simple in use, which protein milk (Finkelstein) was not, and the latter was difficult to prepare. After a few days on skimmed milk, when the number of stools had been reduced, 5 per cent. of lactose was added, and later small quantities of dried milk containing fat were gradually introduced until the patient was convalescent.

Dr. ERIC PRITCHARD (London) said that in fermentative diarrhoea the stools were acid, and where there was proteolytic decomposition they were alkaline. The two conditions required different treatment. To give buttermilk was merely a coarse method of introducing the lactic acid bacillus. In proteolytic diarrhoea he gave lactose with lactic acid bacilli. He found high irrigation of the colon very useful. In acid fermentation the indications were the reverse. Protein milk was then more scientific and successful. Indiscriminate treatment, either with protein or with sugar solution, was unsatisfactory. He did not agree with a previous speaker who had advocated dextro-maltose. Dextro-maltose was liable to ferment as well as other sugars. He reminded the audience of the very severe cases of gastro-intestinal disorder which used to occur when carbohydrate foods were given. He preferred a solution of pure casein to buttermilk, as it was less likely to contain micro-organisms. For the same reason he found saline solution more satisfactory than whey. He agreed with the majority of speakers that cases might be both nutritional and infective. In 1911, in one hospital, there was a severe epidemic with a mortality of 50 per cent. Infants admitted to the hospital for other diseases died like flies in the wards into which cases of epidemic diarrhoea had been introduced. In another institution, where the babies had been well fed and were not sickly to start with, there were no deaths and the duration of the disease was much shorter. These examples demonstrated the infectivity of the disease and the great influence of feeding on the course of an epidemic. The greatest mortality occurred among babies previously fed on carbohydrate.

Dr. NABARRO, in reply, said that for the sake of starting a discussion he had insisted perhaps a little too strongly on his theory that summer diarrhoea was not infective. Not all cases were of the same type. There were a great number of causes of diarrhoea, but he thought that the primary cause in the great majority of cases was nutritional. Dysentery was more common now than before the war. One could not argue that because no lesion was found in the intestine *post mortem* the case was not infective, because in young children, even in typhoid fever, the intestinal lesions were very slight. He found that the reaction of the stools did not help much in diagnosis. It was quite possible that by increasing the acidity of the intestinal contents the growth of proteolytic organisms might be inhibited.

Dr. PATERSON, in reply, said that in the treatment of diarrhoea the first essential was to reduce fat. At Great Ormond Street treatment by starvation had been completely dropped. If it was persisted in children passed

into a state of malnutrition from which they recovered with difficulty. To prevent dehydration hypotonic saline by the mouth was of considerable value. The child was fed every three hours, and between the feeds was given as much saline as it would take. He had known a child take as much as 40 ounces of saline besides its feeds on the first day of treatment. It was a much better method than the subcutaneous injection of fluids. A large proportion of children reacted best to a high protein, low sugar diet. In his experience very few had a low protein tolerance. Protein curd seldom appeared in the stools, but fat curds were very common. The simple methods of treatment were the most effective. Well skimmed cow's milk was usually well borne; sugar could be added; he had also found whey useful. Horlick's milk, which contained 1 per cent. of fat and dextro-maltose, was the second step in treatment; he then gradually introduced cream. Drug treatment was of no value. He did not agree with intestinal lavage as a routine.

THE AFTER-RESULTS OF ABDOMINAL TUBERCULOSIS IN CHILDREN.

BY

HUGH T. ASHBY, B.A., M.D.CAMB., M.R.C.P.LOND.,
Physician to the Manchester Children's Hospital.

THERE are few diseases so common and at the same time so disastrous to health as tuberculosis in children. The number of deaths from this disease, in one form or another, is very large; this is all the more distressing because of the certainty that many deaths might be prevented if proper precautions were taken.

In order to get reliable statistics of cases of abdominal tuberculosis, I have taken only those cases who have been under my own care and on whom I have made notes from year to year. In this short communication I desire to record the results in 250 cases which I have been able to follow up, the earlier cases for twelve years and the later ones for about twelve months.

It is often difficult to say that one is dealing with a case of undoubted abdominal tuberculosis, and it is only by watching carefully for a time that one can be certain. There are many children diagnosed as suffering from abdominal tuberculosis who in reality are cases of indigestion or rickets with a large abdomen. Cases of rickets with dyspepsia, wasting, and the large abdomen, at first closely simulate abdominal tuberculosis. When matting of the intestines or glands is felt in the abdomen the diagnosis is easy.

Two important points must be realized about tuberculosis in childhood: first, that the disease tends to spread by the lymphatics and is nearly always primary in the lymphatic glands; secondly, that the resistance to tuberculosis in early life is at its minimum, but gradually increases as the child grows older.

When we speak of abdominal tuberculosis, we include tuberculosis of the intestines, mesenteric nodes, and peritoneum; one of these may, of course, be very much more marked clinically and pathologically than the others.

Types.

There are three main types of this disease—namely, (1) the plastic or cicatrizing form, which is by far the commonest; (2) the ascitic; (3) the type of case in which the mesenteric nodes are prominently enlarged and palpable. It must be clearly remembered, however, that these are types only, and that they usually and nearly always exist together, although they have special features emphasized in particular cases. This is clearly shown at *post-mortem* examinations on children dying of abdominal tuberculosis.

Symptoms.

The symptoms of abdominal tuberculosis are generally vague at the beginning. The child grows thinner and is pale. The appetite is lost, the abdomen becomes large; there may be vague pains in the abdomen, often some bowel irregularity, such as diarrhoea or constipation, and definite resistance to palpation. In many cases thickening or matting of the omentum or enlarged glands may be felt. Sometimes, instead of the usual insidious onset, there is the acute obstructive type, and the diagnosis is made only at operation. Apart from intussusception, abdominal tuberculosis is the commonest cause of bowel obstruction in young children.

Age Incidence.

Abdominal tuberculosis is common under the age of 5 years, although most common at the age of 3 years, when tuberculosis of all kinds is so prevalent. The disease occurs more frequently towards the end of the first year than is usually thought to be the case, and it is then specially fatal.

Source of Infection.

This is not easy to settle in the case of abdominal tuberculosis. It is stated that rather more than 50 per cent. of cases of abdominal tuberculosis are due to the bovine type of bacillus, and rather less than 50 per cent. to the human type. Cases of tuberculosis of the chest, on the other hand, are practically all due to the human type of tubercle bacillus.

There can be no doubt that anyone living under present conditions, with the unclean milk and dried tuberculous sputum in the air of a large city, has a great chance of becoming tuberculous. It is not from lack of opportunity of infection, but because of the resistance of the tissues, that he escapes. A frequent source of infection is a nurse who has charge of a child, or what is common in the poorer districts is that a person with tuberculosis has lived in the same house with the children and infected some of them.

Abdominal tuberculosis may occur as a part of a general tuberculosis, or as a secondary tuberculous infection through the intestines from the chest. It would appear at first sight as if nearly all cases of abdominal tuberculosis in childhood are caused by a direct infection through milk, which, as you are aware, is liable to contain tubercle bacilli in large numbers. Cow's milk forms the main food of a large number of infants and children, and it is given in a raw state to a high percentage of cases, especially in the poorer districts.

Abdominal tuberculosis is not common in infancy, although the frequent exposure to infection by cow's milk is very great and although the resistance to tuberculosis at this early age is low. It would thus seem certain that cow's milk is not by any means a common cause of abdominal tuberculosis, or, if it is, the latent period is long. This should, however, not prevent us from urging that all milk given to young children should be sterilized. An increasing use of "grade A" and "certified" milk in bottles for infants and children will decrease the liability of infection through milk.

In quite a large number of my cases of abdominal tuberculosis, where one can rely on the parent's statements, no raw milk has ever been given, and yet they have developed definite abdominal tuberculosis, from which they have died.

In Japan and China the children are breast-fed for many months, and there is little or no milk other than the breast given to the children, yet tuberculosis, and especially abdominal tuberculosis, is widely spread among the children. Kitasato says that the use of cow's milk for the feeding of infants is unknown in Japan, and that the native cattle do not suffer from tuberculosis, and yet intestinal and meningeal tuberculosis is as common as in our large cities in Europe. Again, in the poorer districts of our large cities, far less milk is consumed by the children than in the better-class ones, and yet tuberculosis is more prevalent in the former than in the latter.

In my opinion, an enlargement of the bronchial glands is often primary to the enlargement of the glands in the abdomen. An important point is that an infection of lymphatic glands is seldom limited to one set of glands. Practically all my cases of abdominal tuberculosis have enlarged bronchial glands, even those cases occurring in the first year of life, as shown by *x* rays. It would thus appear as if the bronchial glands are, in a number of cases, primary, and the abdominal condition secondary to the bronchial infection. In other words, the abdominal tuberculosis is due to a human and not to a bovine infection in many instances.

There is also the question of the resistance of the organs. Some organs are no doubt more resistant to infection than others, and it would appear as if the bronchial glands are less resistant than the abdominal glands, which drain the intestines.

The Progress.

In judging the outlook of this disease we need to look not at the results as seen at the end of a course of treatment, but at the results as seen many years later. Cases are often thought to be cured after treatment, but when we come to investigate these cases some years later we find that the mortality is a good deal higher than we anticipated at first. We need to be more cautious about calling a case cured too soon. This is well shown by this series of cases, and the outlook in many cases has turned out to be a good deal worse than was thought at the time of ending treatment.

A case of abdominal tuberculosis should remain free from symptoms for at least two years before being pronounced as cured. Practically all the cases that I have watched, if they have kept free from symptoms for two years, have almost invariably done well.

During the first year of life the outlook is practically hopeless, and it is not very much better during the second year of life. The disease is specially difficult to diagnose at an early stage at these ages, and it is possible that there are mild cases which are not recognized and which recover.

I have seen eleven cases under the age of a year, most of them between the ninth and twelfth months, and all of these have died, nearly all from a general tuberculosis. An interesting feature of these cases is that there is a family history of tuberculosis in a near relative in a high percentage of cases. In quite a number also the infants had had no unboiled milk in their lives. It would thus seem that a large proportion are due to the human type of tubercle bacillus.

Looking at the older children, the outlook improves very considerably, although the disease is always a serious one, and one needing prolonged treatment and care. Many cases relapse or develop tuberculosis in some other part of the body later on. The more that one can feel in the abdomen in the way of glands, matted omentum, etc., the worse is the outlook, yet it is remarkable what large masses can disappear in time under treatment. The type of case which has ascites does better on the whole than the plastic or adhesive type. Of my cases with ascites 23 have had a laparotomy performed, and 15 of these are living and well, showing 65 per cent. of permanent recoveries. Thus, many cases of the ascitic variety do well after an operation for the removal of the fluid, but why this should be so is doubtful. After all, the ascitic is turned into one of the plastic variety. This apparent relief by laparotomy is, however, sometimes only temporary, and after a few weeks they take on the symptoms of the plastic type with pain and obstruction.

In so-called tabes mesenterica an abscess may form, and this is generally best left to open at the umbilicus and discharge, in the hope that it will dry up and heal without a faecal fistula. There is always a great risk of a faecal fistula if the plastic variety of abdominal tuberculosis is operated upon.

When we come to analyse the series of 250 cases of all ages, we may sum up the results as follows:

Cured	56 per cent.
Doubtful	8 ,,
Death, or outlook very bad	36 ,,

If we exclude the 11 fatal cases which occurred in the first year of life the table is better, and shows:

Cured	58 per cent.
Doubtful	8 ,,
Death, or outlook bad	34 ,,

Taking the results of children over 5 years of age when first seen, the outlook is shown to be better still—namely:

Cured	62 per cent.
Doubtful	6 ,,
Death, or outlook bad	32 ,,

These statistics go to show how serious the disease is in children; in fact, the outlook for abdominal tuberculosis is much worse than the outlook in chest tuberculosis of children. It would appear that when the mesenteric glands and peritoneum become seriously affected, the body resistance to the disease is small. This would be expected when one comes to consider the large surfaces and organs involved.

When we go into the after-histories of cases who have recovered we find that the large majority have grown up and kept perfectly well. They have no symptoms of the former disease, except that a few have a tendency to colic and to looseness of the bowels. The adhesions and matting of the intestines seem to have but little deleterious effect in the future. In some, however, a mass of calcified glands can be felt many years later in the same situation as the former enlarged glands. These old glands seem to cause no trouble. The earlier a case is treated by rest and suitable diet the better is the outlook.

It is likely that abdominal tuberculosis is a potent cause of sterility in females by causing adhesions and damaging the reproductive organs.

Amount of the Dose.

It is clear that infants and children have every chance of becoming infected with the tubercle bacillus at an early age. As the age of children increases we find that more and more have been infected, but that resistance to infection is such that they thrive in the ordinary way. It is possible that the magnitude of the dose and the continuance of infection has a good deal to do with an illness like abdominal or chest tuberculosis. A long series of doses of infection will most likely set the disease going, while a small dose or doses may be resisted by the child and all goes well, although he is infected. This is clearly shown by the bad outlook when there is a tuberculous parent, who is continually infecting his or her children by living in the same house and by not taking sufficient precautions.

Summary.

I have been able to follow up 250 cases of abdominal tuberculosis in childhood for a number of years, and the results have been analysed. Many cases are apparently cured for a time, but relapse later on; this point must always be borne in mind. The outlook is practically hopeless under the age of 1 year, and not much better under the age of 2 years. However, as the age increases the outlook improves considerably, although the disease is always a most anxious one. The more that can be felt in the abdomen, the worse as a rule is the outlook. The type with ascites does better on the whole than the other types, and this class of case often responds well to operative treatment. The after-histories of children who have had abdominal tuberculosis and kept well for some years are good, even though there are still enlarged calcareous glands felt in the abdomen.

DISCUSSION.

The President (Dr. Edmund Cautley) said that the prognosis in abdominal tuberculosis was not as bad as it used to be. With the advent of abdominal surgery the outlook became suddenly much better. Surgeons sometimes used to open the abdomen under a mistaken diagnosis. Tuberculous peritonitis was discovered and a hopeless prognosis given. Then it was found that many cases recovered. Laparotomy became the popular treatment, and various theories were suggested as to how it worked. The physicians thought that with suitable diet (and diagnosis) the prognosis was good. The outlook was worst in the caseous type unless the disease was localized. The after-effects were wasting, leading eventually to death, intestinal obstruction, and generalized tuberculosis.

Dr. E. A. Cockayne (London) commented on the absence of after-effects in the cases that recovered. He had felt calcified glands and nodules in the omentum years after the original disease, but they produced no symptoms.

Dr. Eric Pritchard (London) agreed in the main with Dr. Ashby's conclusions, except on the point that tuberculosis in children under 1 year of age was specially fatal. Some years ago he himself had made this statement, but since then he had had reason to change his opinion. During the last ten years he had treated a number of children

infected with the human tubercle bacillus from tuberculous mothers. The earliest age at which he had been able to diagnose the disease was fourteen days. He gave an injection of old tuberculin. If the child was infected there was a local and focal reaction. In abdominal tuberculosis an attack of colic with the passage of green motions was observed. Without this test it was very difficult to say whether tuberculosis was present or not. There might be no clinical evidence of the disease. He had followed his cases for years; one child, aged 12, was now alive and well. He had had one death in his series, and that was in an advanced case. He thought that many cases were not recognized. Treatment by tuberculin injections had been very successful. The prognosis was bad when the disease was diagnosed by ordinary clinical means, but good when diagnosed by the test.

Dr. G. Bruton Sweet (Auckland, New Zealand) said that the prognosis of infants suffering from abdominal tuberculosis was greatly improved by the use of tuberculin, especially when of a bovine strain. In a small series of cases of abdominal tuberculosis in infants under the age of one year 5 made a complete recovery after the use of T.R. bovine.

THE TREATMENT OF TUBERCULOUS CERVICAL ADENITIS BY RADIUM.

BY

ECHLIN S. MOLYNEUX, M.R.C.S.,

Honorary Surgeon, Warneford Hospital, Leamington.

It is not my purpose to go into the pathology of tuberculous adenitis, as this was dealt with fully last year in a very exhaustive paper by Mr. John Fraser. I think it will be generally admitted that the various treatments of this complaint, whether surgical or conservative, as carried out all over the country, have in the past not been very satisfactory.

I am quite ready to admit that an early excision will often cure a patient, but even then he has to undergo the unpleasant and painful ordeal of an operation, and a scar of greater or lesser size is left to disfigure his neck. This is especially undesirable in the case of girls, however satisfactory an artistic and neat scar is to the surgeon. Another objection to operation is that often a skilful dissection has been made to remove the affected glands on one side of the neck, and much to the surgeon's disappointment the debilitating effect of the operation has apparently caused a fresh outbreak of the disease on the opposite side which had previously appeared healthy. Conservative measures are usually very lengthy, entailing long visits to the sea or Switzerland, and too often failure at the end of it. It is for this reason that I put in a plea for a method which I have been practising for over ten years with excellent results.

Treatment by Radium.

During the whole of this time I cannot recollect a case that has not been benefited, and I think I am right in saying that only one patient who conscientiously had the treatment carried out has not been apparently cured. This means that one can almost promise to cure a patient whether the disease is early or advanced. The treatment is painless and perfectly safe, provided that scrupulous attention is paid to the technique; I say this because recently a few cases have come under my notice where harm instead of good has been done by wrong doses of radium. Caseating masses of glands, suppuration and secondary infection, and old sinuses are no bar to radium treatment. Unless suppuration has already occurred no scar is left. The skin is sometimes a little red for a few weeks from the effect of the secondary beta rays thrown off from the screen covering the radium—more will be said about this later; the redness always disappears. The one disadvantage of this form of treatment is the cost of the radium and the ease with which applicators are damaged and sometimes lost and thrown away with the dressing.

The period during which I have been doing this work has been sufficiently long to judge whether the cures are permanent. It is excessively rare to find any recurrence of the trouble once it has been apparently cured. The very few recurrences I have seen have responded to a second treatment. In cases of doubtful diagnosis it has been my practice to remove a small piece of affected gland and have sections cut, and if necessary have a Wassermann reaction taken as well.

Technique.

It is unnecessary to go to the length of describing all the initial experiments and the concentrations of radium used. The following is the technique which I now employ. The applicators I use are flat ones; the most convenient size is a square one, one inch square containing the equivalent of 15 mg. of radium bromide. This is the concentration that must be used; I actually use the radium sulphate as it is insoluble in water, but in measuring it one speaks in this country in terms of radium bromide. The radium is spread out on the applicator, which is a plaque of silver 3 mm. thick. It must be mixed with some basic to cause the radium to adhere to the applicator evenly and to prevent loss. I used to employ a special form of varnish with this object, but varnish perishes and is easily cracked if the applicator should be dropped, with consequent loss of part of the radium. Recently I have used applicators in which the radium is incorporated with a form of cement instead of varnish, and these are less liable to damage. The applicator has over it a screen of 1 mm. of silver, then a couple of layers of lint, and finally a couple of layers of thin gutta-percha tissue tied over the whole to prevent any soiling of the screen. The gamma rays of radium are used for this work; the screen of silver absorbs the alpha and beta rays, which if used for a sufficiently long application would cause a burn. A silver screen 1 mm. thick will absorb all the alpha rays and 99.9 per cent.—that is, practically all—of the beta rays. When gamma rays emerge from a metal surface such as a silver screen, secondary beta rays are set up whose action on the tissues is the same as that of the primary beta rays, and it is necessary to provide for their absorption. The layers of lint and gutta-percha tissue absorb these irritating secondary beta rays. The applicator thus protected is strapped to the patient's neck, or wherever the tuberculous glands are. Four hours is, on the average, the correct time for the application. I usually employ two or more applicators in order to cover the diseased area at one sitting.

Dosage.

The frequency of the dose should be twice a week to begin with, and once a week when the glands are markedly subsiding; this is an average frequency, but the effect must be watched and each case judged on its merits. Patients vary greatly in their reactions to radium, some getting well with very few applications, and others requiring many. I have known a mild case recover after two applications, but this is quite unusual. Broadly speaking, patients with early tuberculous glands recover soonest; then those in whom the glands have suppurated; the fibrous type of tuberculous glands and those with large caseating masses that have not become liquefied take the longest time; they often take months to cure.

Treatment is continued until all signs of the disease have disappeared, or, at the most, some fibrous nodules are all that remain. These were for years a source of perplexity to me; an American colleague, however, excised a considerable number and had sections cut. He stated that they consisted of scar tissue and presented no signs of any active disease. If a patient when first seen has a cold abscess I always aspirate the pus under local anaesthesia in order to relieve tension of the skin before starting treatment. If, as occasionally happens, the caseating material is too thick to aspirate, I make a tiny incision with a tenotomy knife and squeeze the pus out. Two or three aspirations are usually sufficient.

Conclusions.

The following appears to me to be a possible theory as to how the radium acts. In treating cancer one gives a dose which causes a maximum amount of destruction; this, then, is a destructive dose of radium. In treating a tuberculous gland the dose of radium employed is of exactly the

opposite type; a dose is given which stimulates the tissues weakened by tuberculous infection to increased vitality and enables the vitalized phagocytes to consume the tubercle bacilli, and, the active source of infection having been removed, to help absorption of the caseating material.

It is unnecessary while a patient is having radium treatment to have the neck fixed so as to limit movement, or to make the patient in any way an invalid. Violent exercise only is prohibited, otherwise the patient is permitted to lead such a life as his general health will allow of, merely avoiding excessive strain and fatigue. The dose of radium employed appears to produce a general tonic effect on the system as well as a local effect on the glands; this I have gathered from the observations of several intelligent adults who have independently remarked on it, and have asked me whether the radium could have such an effect. Carious teeth, diseased tonsils and adenoids, and any other obvious sources of primary infection, must be dealt with at the beginning of the treatment, as it would be folly to cure existing tuberculous glands and leave a future source of infection behind.

DISCUSSION.

The PRESIDENT said that many cures had been claimed which depended on mistaken diagnoses. It was difficult to realize that radium could cure tuberculous glands, but the fact that caseous glands had been present in many of Dr. Molyneux's cases was proof positive that they were tuberculous. He would like to ask how the cost of treatment by radium compared with the cost of other methods such as operation. Would it be within the means of the ordinary individual?

Dr. NABARRO (London) called attention to the difficulty of distinguishing between tuberculous and syphilitic glands in children. A Wassermann test should be done in any doubtful case. Tuberculous glands were less common now than thirty years ago. He attributed this to the attention which was given to-day to tonsils. Glands often subsided after their removal. The tonsil was a path of entry for the tubercle bacillus.

Dr. MOLYNEUX, in reply, said that with regard to the cost he himself treated most cases free, but that it would certainly amount to less than the visit to the seaside, which was so often prescribed. He made certain of the diagnosis in doubtful cases by excising a gland and examining it microscopically; this had been done in a large proportion of his patients. A few had turned out to be Hodgkin's disease. These he refused to treat; it could do no good and might do harm. He had also had a number of cases of syphilis sent him. He always verified the diagnosis before attempting treatment. He agreed with Dr. Nabarro that removal of tonsils and adenoids often prevented the formation of tuberculous glands.

THE REACTION OF THE BLOOD IN CHILDREN.

BY

RUTH CONWAY-VERNEY, M.D., M.R.C.P.,

Late Second Medical Registrar, Manchester Royal Infirmary.

IN this communication, following the suggestion of A. V. Hill, the term cH will be used to represent the H ion concentration, thus omitting the use of logarithms. The cH, according to the Henderson-Hasselbach equation, may be expressed as follows—

$$cH = k.\frac{H_2CO_3}{NaHCO_3}\quad\frac{(\text{dissolved } CO_2 :: \text{to pr. } CO_2)}{(\text{combined } CO_2)}$$

By observing the cH in relation to the tension of CO_2 and to the combined CO_2 we may have some idea of the factors controlling the acid-base balance. Among these factors the blood buffering power is of great importance. Dr. Cammidge has indicated the importance of the presence of buffer acids and buffer salts in the blood stream. I should like to emphasize the value of protein base salts found abundantly as base haemoglobinate in the blood; for example—

1. $NaHb \rightleftharpoons Na^{\cdot} + Hb'$
2. $H_2CO_3 \rightleftharpoons H^{\cdot} + HCO_3'$
3. $NaHCO_3 \rightleftharpoons Na^{\cdot} + HCO_3'$
4. $H.Hb \rightleftharpoons H^{\cdot} + Hb'$

If the CO_2 tension be increased, then equation 2 will act from left to right, causing an increase in dissociated H ions. H.Hb, being weaker than H_2CO_3, tends to dissociate less, and equation 4 will take place from right to left, preventing increase of H ions. Reduction in Hb and H ions leaves equivalent amounts of Na ions and HCO_3 ions—a neutral salt in solution. This will continue until the base available from NaHb is exhausted, and hence the importance of estimating the alkali available as base at more than one tension of CO_2. The power of a given blood to tolerate increases of CO_2 tension and influx of carbonic acid can be observed by plotting the combined CO_2 values at two different reactions. The latter are obtained by exposing a sample of blood to two widely differing CO_2 tensions, and observing the cH and combined CO_2 values at these tensions.

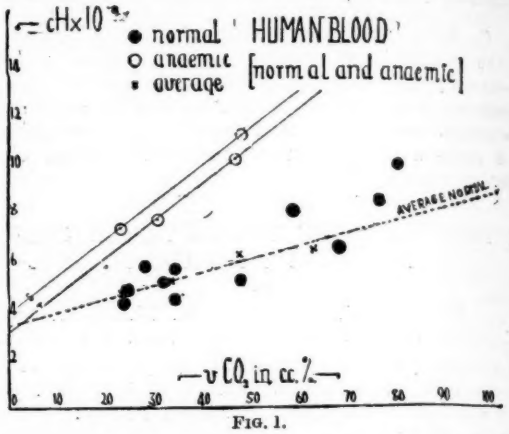
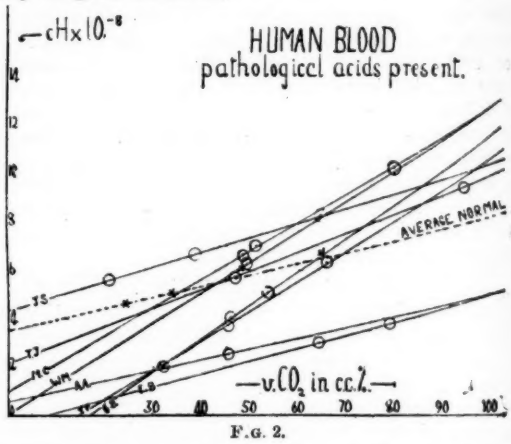


FIG. 1.

Fig. 1 shows the bloods of a number of normal individuals. Crosses indicate the arithmetical mean of readings of the cH at three mean observations of the CO_2 content or combined CO_2 value (alkali reserve). The two steeper curves are the cH—v.CO_2 relation plotted in two cases of anaemia. Lack of haemoglobin allows the cH to increase more rapidly, or may be said to show failure of the CO_2 content to rise as rapidly as in the normal. This shows the necessity of good buffering.



F.G. 2.

Fig. 2 shows the same relation in blood taken from children with post-anaesthetic ketonuria. It is presumed that a large part of the available alkali has been required to unite with acids produced by faulty fat and carbohydrate metabolism. Two cases treated with copious amounts of $NaHCO_3$ solutions showed a lowered cH at any value of v.CO_2. In these cases lack of stimulus to the respiratory centre might cause oxygen lack, and would temporarily increase the alveolar CO_2 provided no impairment of respiratory mechanism were present.

It is hoped to define the normal limits of variation in these relations, and thus attempt to build up a method of prognosis concerning the blood of children about to be exposed to the risk of the presence of ketones and similar acids.

I should like to express my thanks to Professor A. V. Hill, F.R.S., for his supervision and direction of this work, and I must also thank the committee of the Ashby Memorial Scholarship for permission to show cases investigated as work for this scholarship.

SECTION OF LARYNGOLOGY AND OTOLOGY.

E. B. Waggett, D.S.O., M.B., B.Ch., President.

DISCUSSION ON LABYRINTH DEAFNESS.

OPENING PAPER

BY

DAN McKENZIE, M.D., F.R.C.S.E.,

Surgeon, Central London Throat and Ear Hospital; Oto-Laryngologist to the French Hospital, London.

There is probably no organ in the body the anatomy and physiology of which is so accurately, so intimately known to us as the labyrinth. But by an unparalleled concatenation of circumstances there is no organ of the body of whose pathology, excluding suppuration, we know so little. The reasons for this regrettable state of matters, so strikingly at variance with modern medical progress, are simple. Opportunities for observing cases of deafness during their entire course from start to finish are rare. And still more rare are the opportunities of making a pathological examination of such cases at the different stages of their development, an examination which, we may add, demands from the investigator a quite unusual kind of skill, training, and experience. The time and the loved one seldom concur with the place when that place is the labyrinth.

We shall, of course, some day emerge from this darkness and mystification. But that day is not yet, and at the present moment, in a discussion which must necessarily range over the whole field of the non-purulent diseases of the labyrinth, all we can do is to make the most of such pathological and clinical information as we possess. Unfortunately, whatever may be said of the scanty pathological data at our disposal, with regard to the clinical facts we have to confess that they are by no means always so clear and unequivocal as to render the conclusions we base upon them entirely trustworthy.

The first question we have to ask in a review which will be full of questions is: What exactly do we mean by "labyrinth deafness"? If we were to address this question to a pathologist his reply would be simple and definitive, even although it might not carry the clinician very far in his search for enlightenment. "Labyrinth deafness," he would say, "is deafness caused by a disturbance in the labyrinth." But I am not speaking as a pathologist. I have no claim to do so. I have no right to do so. I speak only as an observer of clinical phenomena in general, and at the moment of the hearing tests in particular. And as such, looking back over a collection of many thousands of cases of deafness, I confess that I have often, very often, found it difficult and sometimes indeed impossible to tell, from the results of the hearing tests alone, whether the patient's deafness was due to a middle-ear lesion, to a labyrinth lesion, or to both. And it is possible that most of my hearers find themselves in the same predicament as often as I do.

The textbooks of otology inform us, to be sure, and we who are teachers hand on the rule to our students, that there is a clean-cut distinction, traceable clinically by means of the hearing tests, between a defect in the conducting apparatus and a defect in the nerve organization of the ear. When, for example, in a deaf person, the hearing of tuning-fork sounds by bone conduction is increased, when deep musical tones cannot be heard, while the higher tones of Galton's whistle or the monochord are audible up to or near the physiological limit, then, we say, the deafness is "obstructive," and we are to infer that the impairment of function is due to a lesion situated somewhere in the conducting mechanism; whereas when the bone conduction is diminished, the deeper tones retained, and the higher tones lost, the deafness is "nerve" deafness, and it is to be attributed to a lesion in the nervous structures of the hearing organ.

Yet, face to face with clinical fact, are we not compelled to admit that in nature this precise and comforting distinction does not always hold good? Nay, there are some who say to themselves that the distinction holds good but very seldom, and that any inferences based upon it are therefore fallacious. Let us submit this sceptical attitude of mind to examination.

In the first variety of deafness—the obstructive—when the phenomena I have mentioned are present, no one, so far as I know, has ever thrown any doubts upon the correctness of the inference. Obstructive deafness all acknowledge to be caused by a disturbance in the conducting mechanism of the ear. But this is by no means true of the second type, or "nerve" deafness. And there are undoubtedly grounds for a cautious, if not a sceptical, attitude here. To take only two instances out of many I have myself experienced, I have notes of a case before me as I write in which all the signs of nerve deafness were present, and of nerve deafness of a moderately severe grade. The patient happened to be a personal friend, and, as was natural, I was grieved at the discovery, for I looked upon the impairment as serious. The external auditory meatus on both sides, it is true, was occluded by hard cerumen, but in view of my findings I was unable to promise myself or my patient much benefit from the removal of the meatal obstruction. All the same the clearing of the meatuses was followed by the complete disappearance of every sign of even the slightest nerve or any other deafness. The second case I may mention was one of subacute Eustachian and middle-ear catarrh in which precisely the same happy ending was reached by the simple process of catheterizing the Eustachian tubes.

We are, therefore, compelled to admit that "nerve" deafness may be induced by a simple obstruction in the conducting apparatus. Or, to put the matter in another way, a lesion in the conducting apparatus does not inevitably produce the phenomena of "obstructive" deafness. Now I should like to ask you whether in your experience this disconcerting occurrence is a great rarity.

We must pause here to note the fact that these criticisms are by no means novelties. You will find them carefully and minutely dealt with in the literature of thirty years ago. And Lucae it is who expressly cautions us not to rely upon the predominance of air conduction over bone conduction as indicative by itself of nerve deafness (that is, of a nerve disturbance) unless the hearing power is very much reduced. The whisper, he says, ought not to be audible at a distance of one metre. This, of course, is tantamount to saying that we are not in a position to diagnose from the tuning-fork test results any disease of the labyrinth, any case of nerve deafness, in its earlier stages. But this conclusion, though logical, need not dismay us. The deafness of many cases of the Ménière group, for example, is often quite trifling, and yet it is undoubtedly in most cases due to labyrinth disease. And that deafness is of the classical "nerve" deafness variety. If, then, leaving vertigo out of count for the moment, the signs of "nerve" deafness are present, and if on a general survey of a case—the history, the subjective sensations, the objective appearances of the tympanic membrane, the nose, nasopharynx, and Eustachian orifices, and lastly the results of Eustachian catheterization—we can find no sign of any middle-ear or meatal disease, then surely we are entitled to say, in spite of its mildness, and maybe its brief duration, that the deafness is due to a disturbance in the nerve organization. Of course, this diagnosis can only be a probability. But the probability approaches more and more to a certainty as fact after fact and finding after finding are all found to point in the same direction. And of these findings one of the most important is the type of deafness present. This, then, is the proper use, and here is to be found the value, of the hearing tests. They form one of a large number of significant phenomena, but they can only be used in combination with their correlatives; otherwise they will, ever and anon, mislead us.

I turn now to that very large group of cases in which the phenomena of nerve deafness as detailed above are present, but in which these phenomena are modified by associated obstructive deafness — what we call "mixed" deafness—where the bone conduction is diminished as compared with the physiological, but where a negative Rinne test shows the bone conduction as compared with the patient's own aerial conduction to be increased. I think

all will assent to the statement that this is the commonest type of deafness we encounter. Dundas-Grant, by the way, pointed out many years ago that there is a preponderance of bone conduction over air conduction not only when the Rinne test is negative, but also when it is zero. He goes so far as to make the same decision when the Rinne test, though positive, is less than the normal length for any particular fork.

Fortunately, as we have already said, in making our diagnosis in any case of deafness we are not limited in our examination of the patient to the hearing tests alone. The history of the case tells, perhaps, of attacks, it may be many years before, of nasal or nasopharyngeal disease; we learn, maybe, that the deafness varies with the weather, that tinnitus is a prominent symptom, and so forth. And finally our objective examination may reveal changes in the Eustachian tube or tympanic cavity. The upshot is that we are able to say confidently, in most cases of mixed deafness, that whether there is or there is not a lesion or a defect in the labyrinth, there are certainly changes in the conducting apparatus sufficiently great to cause considerable deafness.

But how are we to account for the presence of the signs of nerve deafness? Now we know as certainly as we can know anything that a lesion limited to the labyrinth does induce the phenomena we call pure nerve deafness. We are, therefore, entitled to suppose—though to be sure it is only a supposition—that when nerve deafness is present in a case of meatal obstruction or middle-ear disease, whether that nerve deafness is pure or mixed, so long as the general deafness is pronounced, we are entitled to suppose, I say, that these obstructing lesions in some way lead to a disturbance in the cochlea. How do they do so, and what is the disturbance they cause?

In many cases, no doubt, cases (say) of serious and it may be long-continued disease in the middle ear, the pathological process extends to and implicates the labyrinth. Microscopic examination has frequently disclosed in such cases as these degenerative processes in the cochlear structures. But it is necessary to recall to your memory that, according to Politzer, the labyrinth is not affected save in the "chronic adhesive processes" of the middle ear, and in otosclerosis, and in syphilis. In chronic non-purulent middle-ear catarrh the labyrinth, "except in rare cases," is, we are told, undamaged. There is, however, a great deal to be said for the active participation of the labyrinth in middle-ear disease. The frequent occurrence of spontaneous nystagmus in acute suppuration of the middle ear proves the readiness with which lesions in the one will influence the functions of the other.

As to the manner in which simple lesions of the conducting apparatus unaccompanied by cochlear changes may induce the phenomena we usually associate, and with reason, with cochlear and other diseases I am ignorant. Here we come upon one of the gaps in our knowledge. Perhaps the defect in the cochlea, seeing that the phenomena disappear with the obstruction, is only functional. On the other hand, there may be some varieties of obstruction which, without affecting the cochlea at all, induce of themselves what we call nerve deafness. As things are at present this may seem to be a large assumption to make; nevertheless there are many authorities who subscribe to this opinion.

Leaving all such theoretical considerations on one side and turning to clinical facts, there is, as my figures show, one generalization formed from these facts which we may safely venture upon, and that is that the most common single cause of nerve deafness known to us, whether that nerve deafness be due to an organic or to a functional cochlear change—the *commonest individual cause of nerve deafness is middle-ear disease.*

Let us now inquire whether the foregoing critical considerations have any practical meaning for us. It has often been said—it is, indeed, almost an otological truism—that when objective indications of middle-ear disease are present, and when the typical obstructive deafness of such a case is modified by the presence of the phenomena of nerve deafness, then the prognosis is unfavourable. In so far as this applies to the cure of severe deafness in chronic cases I agree. But to say that such findings invariably foreshadow a progressive deterioration of hearing would, in my opinion, be going too far—save, perhaps, in otosclerosis. Doubtless in many cases progress downward does continue. On the other hand, I am inclined to say that if the disease process in the middle ear can be arrested then the deafness, even when it manifests some of the signs of nerve deafness, may become stationary, at all events until the patient reaches old age. In support of this statement I can cite instances from my own practice; I know patients whose deafness has remained thus stationary for the last fifteen years. We should, therefore, avoid taking too gloomy a view of nerve deafness when middle-ear disease is present if—and the proviso is important—if the middle-ear disease is of a kind likely to be brought to a period by treatment.

Before we leave the subject of mixed obstructive and nerve deafness it is necessary to consider one variety of this class which is eminently amenable to treatment. I allude to myxoedematous deafness. There are some otologists who, they tell me, make a practice of submitting all cases of mixed deafness to a course of thyroid medication, and this practice has much to commend it. For deafness seems to be often quite an early phenomenon in myxoedema, and the response to thyroid treatment may thus give us a pleasant surprise. Myxoedematous deafness has another lesson for us: it shows that middle-ear and labyrinth deafness may coexist—not because one is induced by the other, but because both are due to a common cause. The same lesson, by the way, may be learned from otosclerosis.

I suppose you will agree that, speaking generally, all high grades of deafness show signs of involvement of the labyrinth. At all events, the upper tone limit is lowered and bone conduction shortened. And, *a fortiori*, when a patient is deaf to all sound by air we expect to find those signs of nerve deafness very pronounced. Nevertheless, I once had an opportunity of examining a lady, who had been deaf for forty years to all sound but thunder, in whom the bone conduction was actually increased. In view of the fact that as long as the perceptive mechanism remains intact some amount of hearing must persist, this case is hard to explain except on the assumption of a functional defect either in the end-organ or in the cerebral hearing centre.

It is a curious circumstance, by the way, that labyrinth disease in adult life but seldom leads to complete abolition of function. Some amount of hearing even in the worst cases is left, although it may be but a trifling amount and of no practical value to the sufferer. Of non-purulent diseases affecting both ears progressive nerve deafness, syphilis, and epidemic meningitis alone are liable to end in absolute deafness; while, though herpes oticus and mumps lead to complete deafness, it is less crippling in that it is only unilateral.

The condition of the vestibular reactions in suspected labyrinth deafness is interesting, and it is a question to which I have paid some little attention. Broadly speaking, cochlear disease, as evidenced in the phenomena of nerve deafness, is associated with impairment or complete abolition of the vestibular reflexes. And when this is the case we may look upon it as suggestive at least of some organic cochlear disease; because clinical experience has shown us that the canalicular section of the labyrinth is very frequently indeed affected, in some way not yet understood, by serious cochlear trouble. It is necessary, however, to add the caution that, as with the hearing tests, so with these reactions, considerable variety is encountered in practice.

Everyone has noticed, of course, how acute disease of the labyrinth is accompanied by attacks of severe and it may be prolonged vertigo, whereas, on the other hand, in chronic labyrinth disease, while, as I have just said, the vestibular reactions are often impaired, vertigo—at all events severe vertigo—may be entirely absent. According to my figures vertigo of the "storm" type was present only in about 11 per cent. of the cases of pure nerve deafness.

Now it is remarkable that in mumps deafness the attack, albeit often dramatically sudden and complete, is not accompanied with vertigo nor with impairment of the vestibular reactions. Here we come upon another of those gaps in our pathology. The lesion that causes mumps deafness is unknown. But our clinical experience permits us to surmise that the lesion is either not situated in the labyrinth,

or else, if it is situated there, it cannot be of an inflammatory, exudative, or haemorrhagic nature. Otherwise the highly sensitive canalicular end-organs would be irritated and vertigo would occur. This reasoning is strengthened by the fact that mumps deafness is unilateral. I have recorded the occurrence of mumps deafness without parotitis but with orchitis. And if orchitis may occur alone in a case, as it does sometimes in a mumps epidemic, are we not entitled to assume that deafness due to the mumps virus may also sometimes appear as the unique expression in a patient of this infection? This may be the explanation of those cases of unilateral deafness in children to which Richard Lake drew attention some years ago.

The symptom of vertigo, so common in labyrinth disease, may nevertheless attend, as Urban Pritchard and Sydney Scott have pointed out, upon almost any ear disease—even impacted cerumen; it is by no means uncommon in simple Eustachian obstruction. Excluding sudden and complete destruction of one labyrinth, vertigo is due to an irritation of the vestibular end-organ. It is, that is to say, of the same order of events as tinnitus. Now it is a fact, I think, that while tinnitus is by no means unknown in uncomplicated labyrinth disease (I have noted it as "severe" in about 5 per cent. of my cases), still it is much more common in middle-ear disease. If, then, tympanic changes so frequently induce one form of labyrinth irritation—tinnitus, to wit—we cannot be surprised to learn that they may also induce that other form of labyrinth irritation, vertigo. But it is noteworthy and even a little puzzling to consider that vertigo is more commonly a symptom of a lesion inside the labyrinth than of a lesion limited to the middle ear. Why should tinnitus be a commoner middle-ear symptom than vertigo, if both are due to labyrinth irritation?

At this point we come upon a problem of great difficulty—that of the Ménière syndrome. Will you forgive me if I ask you, in order to free our minds from preconceptions, to let me discuss this group of symptoms (tinnitus, deafness, vertigo, nausea, and vomiting of a paroxysmal character) under the name of the "labyrinth storm"?

I have already said that vertigo may attend almost any disease of the ear. Well, the same seems to be true also of the labyrinth storm. At all events, in going through my cases, I have heard it complained of not only in pure nerve and mixed deafness, but also in obstructive deafness. I can give you the notes of a case in which it had occurred, not once but several times, and yet in which I found the upper tone limit normal and the bone conduction increased. Indeed, it is impossible to look upon the labyrinth storm, as it appears in the series of cases, as anything more than merely a severe variety of vertigo. For we encounter it in all gradations, from a momentary loss of equilibrium to the definite and prolonged crisis, either with or without vomiting. And this gradation, this variation, characterizes not only these cases considered as a whole, but sometimes it may even occur in one individual case.

From one point of view, therefore, to look upon the labyrinth storm as anything more than a severe kind of vertigo would seem to be illogical. We must note, however, that if, as we said, simple vertigo is more frequently due to a labyrinth than to a middle-ear lesion, the same remark must be made and with even greater force regarding the labyrinth storm. For it generally indicates—as the hearing tests, made in the intervals between the attacks, show—not merely a transient labyrinth disturbance, but a definite lesion which induces changes of a permanent character.

What is the nature of this lesion? In certain cases we are able, from our clinical findings coupled with our pathological knowledge, to give a satisfactory answer to this question, but in most cases we can give no reply better than a vague surmise.

Let us take the former class first. In suppuration of the middle ear the labyrinth storm occurs under two conditions: first, when purulent labyrinthitis is set up by a sudden and massive invasion of the labyrinth spaces by pyogenic organisms; and secondly, when, without actual, or at least massive invasion, toxins of these organisms induce what we call serous labyrinthitis. In the former event, the sense organs of hearing and equilibration being destroyed, the labyrinth storm does not recur. In the latter event, the end-organs, though they may be permanently damaged, are not destroyed, and obviously the storm may recur.

Now, arguing from these events, it is not, I think, drawing the long-bow to suggest that, when the labyrinth storm occurs in the course of a chronic or subacute non-purulent otitis media, something happens comparable to the serous labyrinthitis of purulent otitis media. And proceeding with our surmise, may it not be the same kind of change that induces the nerve deafness element of a "mixed" catarrhal case?

Secondly, we know the lesion that induces the labyrinth storm (when it occurs) of herpetic deafness. In this case the virus attacks not the end-organ but the vestibular ganglion and with it usually the ganglion of the cochlea. This variety also is non-recurrent.

Thirdly, in syphilis of the labyrinth, which we shall deal with more particularly later on, the labyrinth storm is a frequent and recurring symptom.

Lastly, we have definite pathological information, the value of which we shall estimate in a moment, in Ménière's disease.

Now, you may be surprised to hear me use the term "Ménière's disease" after my request to be allowed to substitute the expression "labyrinth storm" for "Ménière's syndrome." But I am not so inconsistent as I seem to be. Apart from the justifiable objection to calling any disease entity after a person, I am bold enough to say that, if we may credit the classical otological writers, there is a group of symptoms dependent upon a definite pathological lesion which is as worthy of the name "Ménière's disease" as any other disease is of the name of its discoverer. Can anyone read the account of this very rare disorder in Politzer's *Diseases of the Ear* without being convinced that we have there the description of a symptom-complex which is distinct and individual, and which, I hasten to add, for the sake of clearness, is by no means the same condition as the transitory attacks of vertigo, deafness, and vomiting we are so constantly hearing about in our practice? The differences between the two varieties, the rare and the common, are great and striking. In the former the attack is of overwhelming severity, and its effects are not only devastating, they are permanent. The attack itself presents many indications of a general and profound disturbance in the brain. It is attended with unconsciousness. The hearing is utterly and finally destroyed, and the deafness may be bilateral. The dizziness and the disturbances of equilibrium gradually subside after the attack, it is true, but unsteadiness in gait may continue for years. Politzer calls it "apoplectic," and we cannot deny that the epithet is apt and correct if we accept Ménière's finding of an extravasation of blood into the semicircular canals as a reliable observation. Here, however, we encounter another difficulty. Ménière's *post-mortem* observation of haemorrhage into the canals does not seem, apart from what happens in leukaemia and other blood disorders, to have been corroborated. On the other hand, it has recently been suggested that what he saw was perhaps not a simple haemorrhage but a haemorrhagic septic labyrinthitis (Sydney Scott).

I may say that I have never in my practice come across a case answering clinically to Politzer's description. Only once have I heard a patient insist that during the attack he became unconscious, and in his case the deafness, when I saw him, was not great.

Contrast that picture with the relatively mild disorder we so commonly hear about from our patients. (By the way, we very seldom have an opportunity of seeing the patient during the attack.) In this type during a period of several months or years the patient experiences at irregular intervals a succession of attacks, of which the earliest are usually but not invariably the most severe. The symptoms vary in severity. Vertigo is always present and nausea, but often there is no vomiting. In some cases the crisis ends, after an hour or two of acute discomfort, in sleep. But unconsciousness does not occur, and the deafness is only partial, or if it is complete at the time of the attack, hearing returns on recovery, although a certain amount, perhaps a considerable amount, of deafness remains. Yet the attacks do not seem, even when untreated, to lead to complete loss of function. As a rule one ear is the more affected, but

both may become in the course of time about equally deaf. I have only seen four cases (out of 41), I may say, in which the deafness was confined solely to the one ear. But the process seems to be self-limiting; for as time goes on the crises become less and less severe, until finally they disappear altogether, leaving the patient more or less deaf, but not stone-deaf. This variety is obviously very different in nature from the apoplectic type.

Now, as I have already pointed out, the recurrent labyrinth storm may arise from a variety of lesions situated in a variety of places, so that to regard this, the ordinary type of the malady, as a disease entity having a precise pathological meaning would seem to be flying in the face of common sense. Yet, as a clinical picture, to my eye at least, it has the look of a definite disease, at all events when middle-ear trouble can be excluded. But what the nature of the lesion may be in this mild variety we do not know. Here again we stand in need of reliable pathological data. Meantime, is it permissible to hazard a guess as to its nature? Allow me to postpone my answer to that question.

This type is certainly in most cases benefited, and indeed it is often promptly cured, by medicinal treatment. Potassium iodide has a well merited reputation for modifying and even stopping the attacks. And I have sometimes found a combination of nux vomica and potassium bromide (gr. x) equally efficacious.

There is, however, yet another, a third group—that, namely, in which the attacks occur very frequently, often being induced by slight causes, such as a change in body position, and in which no tendency to spontaneous improvement is manifested as time passes. Moreover, in this variety medicinal treatment is of no value. Naturally, this is a state of matters which may entirely incapacitate a patient from following his occupation. As to the pathology of this particular type, much has been conjectured, but little really is known. It differs, however, from the first two groups I have specified, chiefly in the frequency of its attacks, a feature which suggests that the canalicular system is in a continual state of hypersensitiveness. The deafness, moreover, is more severe than in the second group.

We may suppose, indeed, as Spear did some thirty years ago, that we have here to do with a rise in intralabyrinthine pressure, analogous to the elevation in intraocular pressure of glaucoma. Under the influence of this idea severe, frequently recurring, and obstinate vertigo has lately been treated by "uncapping" the external semicircular canal (suggested by Cheatle and carried out by G. J. Jenkins), or by more radical procedures (Hugh Jones, R. Lake, W. H. Kelson).

Some have found vertiginous attacks (type unspecified) associated with a high blood pressure, while others, like Albert Gray, are of opinion that they are more frequently associated with an abnormally low blood pressure. At all events, some cases, as we have seen, are cured by potassium iodide, others by ernutin.

Finally, on one occasion I found the attacks and their effects wholly evanescent. The patient, a young woman, recovered not only from the vertiginous attacks, but also from the deafness. When last I saw her the hearing was normal. Moreover, I formed the opinion that in her case the recovery took place spontaneously, as she had many remedies during the course of her illness without any apparent benefit.

In concluding this section of our review I must once again emphasize the need for thorough pathological investigation in order that we may be delivered from the darkness and confusion that envelop us. Vertigo is only a symptom. The Ménière syndrome is only a group of symptoms, induced, as acute septic labyrinthitis proves to us, by some sudden change in the vestibular system. What are the causes of this change in non-purulent cases?

Labyrinth deafness from noise claims our attention next, chiefly because with the ever-increasing use of loud machinery in modern life it is becoming more common. Welcome efforts, however, are now being initiated to reduce industrial noises and their attendant industrial fatigue. They deserve our hearty support. Noise deafness, as Wittmaack's experiments indicate, is due to degeneration of Corti's organ from over-stimulation, and Ritchie Rodger has shown that, in the early stages at all events, the deafness corresponds with the pitch of the causative noise.

A question here suggests itself. Is there any reason to suppose that the ordinary noises of modern life—the din of trains, tubes, motor buses, motor cars and cycles—induce a degree of nerve deafness in sensitive individuals of the general population? Another question I should like to ask. Does the deafness induced by loud noise progress after the exposure to noise has come to an end, or does it remain stationary? My own observations are too limited to allow me to form an opinion on this point. So far as I have observed, however, the deafness seems to remain stationary if exposure to noise is avoided. But I have sometimes noticed that these people become very deaf when they get old. It is as if the noise deafness led to an unusually severe senile deafness. But I should like to hear the views of others on this matter.

Senile deafness requires no particular description. But here also are one or two points worthy of attention. One is the peculiar absolute deafness caused by impacted cerumen in the meatuses of people suffering from mild senile deafness. This I have twice observed. On the removal of the wax hearing was at once re-established—that is to say, the patient was able to hear, although by reason of the senile deafness not so well as a normal person. This looks like functional deafness again.

As we get older the upper tone limit is lowered. Normally this seems to set in between 50 and 60, and the defect may be regarded as physiological unless the hearing for speech is impaired. Inasmuch, however, as we come across people who are prematurely aged, so also we may get early senile deafness. Not only so, but just as there is what we may call a regional senility, such as the untimely blanching of the hair, the early arcus senilis, and the like, so also may it not be that some cases of nerve deafness, coming on without any apparent cause in comparatively young people, are due to premature regional senility of the cochlea?

Moreover, the increasing deafness that attends upon chronic middle-ear deafness after middle life is also probably due to senile changes in the labyrinth. Perhaps the functional deafness we have so often hinted at eventuates in an early atrophy of Corti's organ from disuse. On the other hand, the close pathological partnership between the middle ear and the labyrinth is noticeable even in senile deafness, which is due not solely to cochlear change but also to an insidious thickening of the tympanic mucosa with stiffening of the ossicular articulations.

Now there is an insidious form of nerve deafness, known as progressive nerve deafness, which appears without any signs of labyrinth or canalicular irritation, without either vertigo or tinnitus. It is a silent deafness.

Unfortunately, in this connexion as elsewhere we have to report much discrepancy in the pathological evidence. Some have observed a general degeneration of the auditory nerve system, starting at the auditory "nerve root" and extending peripherally to involve the organ of Corti. Others see the process beginning and ending in the ductus cochlearis. Clinically also the voices are not in accord. Manasse states that it occurs chiefly in old men. Politzer says it may appear in young people. The term "progressive" implies that it is a disease which marches steadily on to its end, which is the total destruction of the sense organ and complete deafness; yet Seligmann says it sometimes comes to a standstill. Finally, Manasse mentions as its possible causes arterio-sclerosis, syphilis, chronic nephritis, and middle-ear inflammations, all of which, I may add, are diseases either inducing or induced by senility, general or regional.

In other words, I suggest that this progressive nerve deafness is simply a senile change which may appear untimely. And my suggestion is favoured by the fact that the changes induced by senility resemble those we have described, consisting as they do of an atrophy, this time of the auditory nerve endings. At the same time one would be careful not to proceed beyond suggestion at the moment. Here, as elsewhere, we require more, much more, pathological information than we at present possess before our opinions are worth making, much less listening to.

We pass now to syphilis of the labyrinth, of the anatomical changes of which, said Politzer in 1909, "but little is

known." Of that little we proceed to give a summary. At that time some six cases of acquired syphilitic deafness had been examined *post mortem*, and one only of congenital deafness (Walker Downie). Since then, however, J. S. Fraser has added to our knowledge by the publication of a case, detailed with characteristic thoroughness and care.

This is not a large collection of instances, and their value as evidence is somewhat impaired by the fact that many different lesions are described. Toynbee observed a "thickening of the periosteum" of the vestibule; Moos, a similar thickening, together with lymphocyte infiltration of the labyrinth spaces; Moos, in a second case, with Steinbrügge, osteomyelitic changes in the bone with degeneration of the cells of the spiral ganglion; Manasse, in one case, lymphocytic infiltration of the acoustic nerve, and, in a second case, new-formed connective tissue in the scalae tympani and vestibuli, and in the perilymphatic space of the vestibular apparatus; Politzer, atrophy and destruction of the spiral ganglionic cells without any change in Corti's organ or in the semicircular canals; Moos and Steinbrügge, again, degeneration of the spiral ganglionic cells and atrophy of the acoustic nerve. That is to say, changes have been found in all the labyrinth structures separately, and in two or more of them in combination.

With regard to congenital syphilis the information at our disposal is still more scanty. This variety of the disease is divided into three according to the time of its appearance: (1) foetal and infantile; (2) young children (1 to 7 years of age); and (3) late (7 to 13). Of the first Fraser summarizes the pathological findings as follows:

"(*a*) Otitis media is of common occurrence not only in syphilitic infants but also in syphilitic children born prematurely. (*b*) The infective process in the middle ear has been found to involve the labyrinth in some cases . . . by invasion of the vestibule through the oval window. (*c*) Delayed ossification of the labyrinth spaces. (*d*) Intrauterine meningitis in the region of the internal meatus and neuritis . . . of the eighth nerve. (*e*) Baratoux, in addition to purulent otitis media and interna, has noted changes in the blood vessels. (*f*) In numerous cases haemorrhages have been observed in the middle and inner ear, but such findings must be discounted, as they are probably due to suffocation. Pause, however, holds that the haemorrhage is of syphilitic origin. (*g*) Changes in Corti's organ, and in other parts of the membranous labyrinth and nerve apparatus, especially the spiral ganglion, have occasionally been noted."

In the second group, that of young children, Fraser could not find any definite pathological information.

In the third or late group microscopic examination, until Fraser investigated his own case, was "almost entirely lacking." The generally accepted view was that congenital syphilitic deafness is due to a syphilitic neuro-labyrinthitis. But this view has not been confirmed by microscopic examination. In his own case the patient had suffered from chronic purulent otitis media. As a result, Fraser thinks, of the syphilitic disease, the infective process slowly spread from the middle ear to invade the bone of the labyrinth, giving rise to a chronic osteomyelitis with porosis until the lining membrane of the bony labyrinth was perforated and granulation tissue with giant cells formed in the perilymphatic space. The nervous structures were implicated. Corti's organ was partly replaced by cells, and there was a little meningeal infiltration in the internal meatus. These changes, however, he held to be secondary to the osteomyelitic process.

Fraser emphasizes the rôle played by the middle-ear disease in producing the labyrinth changes, and he cites the clinical findings of himself and others to show how frequently congenital syphilitic nerve deafness is accompanied by middle-ear changes.

Whether labyrinth changes independent of middle-ear disease, such as occur in acquired syphilis, ever occur in the late congenital disease, we have so far no microscopic evidence to show. On the other hand, however, it has been repeatedly noticed, clinically, that in the acquired disease also syphilitic nerve deafness may follow upon otitis media, catarrhal or purulent, in a syphilitic subject. It is as if a simple inflammatory lesion in the middle ear had the effect of precipitating the specific infection upon the labyrinth.

My reason for a rather deeper and more detailed incursion into this particular branch of our subject will now be clear to you. It has been made with the object of enforcing the lesson I gave in an earlier section of this paper, that disease in the middle ear is liable to become the stepping-stone to labyrinth disease and labyrinth deafness. In view of the possibility of syphilitic infection it is a clinical rule of value to have the Wassermann reaction taken in all cases of nerve deafness occurring before the age of 50, and this rule is all the more important when the deafness is making rapid progress.

As to the results of treatment in this variety of labyrinth deafness my experience unfortunately compels me to speak cautiously, as I have not, I confess, been very lucky. In some cases, certainly, the administration of mercury and potassium iodide has been followed by an arrest in progress, and even, in one or two cases, by an improvement in the hearing. On the other hand, I have known syphilitic deafness to improve without treatment, and I have seen it progress in a few months to complete loss of function while the patients were undergoing energetic treatment, both by mercury and potassium iodide alone, and by salvarsan combined with mercury. Some authorities make a practice of administering salvarsan in these cases, but the possibility of the Herxheimer reaction always makes me avoid the drug. Perhaps I am unduly timid. At all events, it would be instructive to hear your opinion on this point. My experience also of blistering the mastoid, extolled as it is on the high authority of Urban Pritchard, has not so far been encouraging.

In treating syphilitic deafness the older otologists were in the habit of using pilocarpine. But this remedy seems to have gone out of fashion. Judging by the warm expressions in its favour one reads in the older literature, perhaps we ought to make a new trial of it. On the whole I am, however, almost persuaded that syphilis of the labyrinth advances or comes to a standstill altogether independent of our efforts. But I am prepared to hear this opinion controverted.

Herpetic nerve deafness I have come across not infrequently. The diagnosis is usually not doubtful if the patient is seen when the herpetic rash is present. Moreover, other cranial nerves (facial, vestibular, etc.) are frequently involved. It is a unilateral disease and the deafness is irremediable. Its distribution in time suggests some epidemic influence.

A case of true nerve deafness necessitates a general overhaul of the patient. The otologist must school himself to be a physician as well as a surgeon. We encounter deafness as an early though rare event in tabes dorsalis and in diabetes and Bright's disease. But perhaps I am here overstepping the precise limits of our subject.

Attempts have been made, by the way, to distinguish labyrinth deafness from that due to affections of the auditory nerve. According to Gradenigo, the latter induce diminished perception chiefly of the tones in the middle of the range, and sometimes even their entire loss. Again, some information, it is said, can be derived from the vestibular reactions. When the caloric test is negative and the galvanic test positive, a lesion of the cochlea is to be inferred, as the electric current overflows it and stimulates the nerve. From disease of the auditory nerve centres in the brain it is distinguished by the absence of other indications of brain disease.

Toxic deafness is a subject of considerable importance, but I do not propose to enter into it save as an introduction to another suggestion I wish to lay before you. Before doing so, however, I should like to ask whether you have come across tobacco deafness, on which Wyatt Wingrave wrote a paper some years ago. It has even been said that excessive tea-drinking may lead to deafness, and Sharp records a case. With regard to quinine deafness, I know that our President has a few comments to make, and so I leave that detail to him.

On several occasions cases have been recorded in which the cause of the deafness, often of the labyrinth storm type, seems to have been intestinal toxaemia, and what I am about to say follows naturally upon the mention of this possibility.

So far as we have now come in our dissertation we have been dealing with many unknown problems and hazards. But throughout we have been able to speak of the labyrinth deafness as of a definite kind and due to a definite cause.

We have touched upon mumps deafness, noise deafness, syphilitic deafness, herpetic deafness, and we have suggested that a large, a very large, class of labyrinth deafness is due to middle-ear disease. Now, however, it is necessary to face what is after all our central problem. Even including labyrinth deafness secondary to middle-ear disease or produced by those causes to which we have alluded, how relatively seldom it is that we are able to surmise, even vaguely, what the cause of their trouble may be in patients who consult us with nerve deafness! Out of 345 cases in my own private practice I find that in 129, or 36.3 per cent., the cause remained unknown. And as the cause is hidden so it comes about that our treatment is purely haphazard. To some we give nux vomica, to others potassium iodide, to all our sympathy. And there the matter ends.

But must we always be standing in deep resignation before this problem? Have we really done all that we can to solve it? Let us see.

Of late years we oto-laryngologists have become accustomed to ophthalmologists sending to us cases in which, say, irido-cyclitis or retino-choroiditis is present, which they suspect to be the effect of some septic focus such as pyorrhoea, septic tonsils, or nasal sinus suppuration. In many of these cases the removal of such foci seems to exercise little or no influence upon the ocular trouble, yet every now and then a brilliant result rewards our efforts. Is it not possible that in the labyrinth also lesions due to a remote septic focus may occur? And I should like to ask this question particularly regarding the group of the labyrinth storm cases to which I alluded in an earlier section. Many of these cases can be explained, it seems to me, in this way. Some of them are "gouty"; others, as in a case reported by Spalding, may even manifest ocular lesions. Here is a question that ought to be answered; perhaps it will be answered to-day. In any case such a problem can only be tackled in one way—namely, by the methodical removal of such foci from patients with deafness for which no other cause can be found. A prolonged and widespread experimental therapy is, in fact, called for. It may, after all, come to nothing. But it is certainly worthy of trial, and of trial on the living patient, for this is one of the problems no mere pathological inquiry could solve.

As we look back now upon this sketch of labyrinth deafness perhaps to the practising otologist the most unsatisfactory feature of a picture by no means wanting in shadow is that in the article of treatment we are so sadly deficient. And however great progress may be in the future, it will always be true, I fear, that treatment will remain unsatisfactory. Nothing can restore a destroyed sensory end-organ. Nothing can rejuvenate an organ of Corti rendered senile by age and disease.

Yet we are not without hope. For although we cannot cure a destructive cochlear lesion we can at least prevent its occurrence in a large and important group of cases. There is reason to believe, as we have seen, that most cases of labyrinth deafness are due to middle-ear disease, and many advancing diseases of the middle ear can be, if not cured, at least brought to a standstill. Thus it is in prevention that our most powerful remedy is to be found. Fleeting attacks of middle-ear catarrh in children and young adults, occasional bouts of earache, little turns of deafness from a "cold," should receive the strict attention they deserve. And a heavy responsibility rests upon those who venture to decry such a simple operation, for example, as the timely removal of adenoids in the young. For there is good reason to believe that those trifling and evanescent attacks foreshadow serious middle-ear deafness in early manhood, and later the grave and irreparable involvement of the labyrinth.

LITERATURE.

In addition to the textbooks of otology the following may be consulted:

Dundas-Grant, J.: Rinne's Test, *Journ. of Laryngol.*, vol. viii, 1894, p. 608.

Mackenzie, Stephen: The Pathology of Vertigo (Ménière's type), *Journ. of Laryngol.*, vol. viii, 1894, p. 278 (abstract).

Barr, Thomas, and Scott, Sydney: Hearing Tests. *Proc. Roy. Soc. Med.*, Sect. Otology, vol. v, 1912, p. 97.

Gradenigo, G.: Affections of the Auditory Nerve, *Journ. of Laryngol.*, vol. vii, 1893, p. 199 (abstract).

Jenkins, G. J.: *Proc. Roy. Soc. Med.*, Sect. Otology, vol. iv, p. 116.

Fraser, J. S., and Muir, R.: *Journ. of Laryngol.*, vol. xxxii, 1917, p. 8.

Spalding, James A.: *Transactions* Ninth Internat. Cong., Boston, 1912, p. 574.

DISCUSSION.

Mr. W. M. Mollison (London) agreed as to the difficulty in distinguishing, by hearing tests, between conductive and nerve deafness. He divided deafness into qualitative and quantitative. The qualitative group included those with lower tone loss and upper tone loss, while the quantitative group included cases where the tone limits were normal but there was general diminution. Some of these were familial, some toxic—due, for example, to influenza, mumps, or tonsillitis; he had seen one case of mumps with vertigo. He mentioned Jenkins's point of the relation between Paget's disease and nerve deafness, and gave notes of a case. Mr. Mollison then dwelt upon the importance of loss of the upper tone limit, and the use of the monochord in comparing air and bone conduction. In syphilis a helpful sign was diminution of the upper tone limit through bone. He called attention to the acuity of hearing of the blind and of certain types of war neurasthenics, who could hear a whisper for long distances. He also spoke of the extraordinary sensibility to cold and to pressure of the vestibules of some of the latter patients. Were the semicircular canals, he asked, becoming less and less valuable to man? He suggested that perhaps these neurasthenics were not able to exclude useless stimuli as other people had to learn to do.

Mr. A. J. Wright (Bristol) said that every case of vertigo was not in need of middle-ear treatment. It might fix the patient's attention on his symptoms. In regard to mumps, in an epidemic he had found that in two cases of deafness due to mumps vertigo was present. In noise deafness, if the noise was removed the deafness did not as a rule progress. He classified 71 cases from the point of view of etiology, dividing them first into two groups—those with an obvious cause, such as trauma or syphilis, and those with a doubtful cause. There were 31 males and 40 females; excluding those cases caused by trauma and noise, the condition was present in women much more frequently than in men. In the war cases there was always pre-existing middle-ear disease. Of the doubtful cases, septic foci seemed to be the cause in four, the foci being in the teeth or tonsils. Functional cases were six in number, and had begun with some suggestion, such as syringing the ear. Of the other cases most were found in association with vasomotor rhinitis, childbirth, and thyroid deficiency.

Sir James Dundas-Grant (London) said that in senile deafness "senile" did not mean old age but old arteries. Vertigo in middle-ear disease was due to mechanical considerations, the safety valves, the fenestrae, being prevented from acting by adhesions. Quinine was of value in unilateral labyrinthine vertigo, given in half-grain doses, the explanation of the benefit being that it caused a diminution of sensitivity of the sound ear. Loss of upper tone limit meant a lesion in the cochlea. The tuning-fork tests were open to fallacies. He raised the point of whether diseased middle-ear cases as seen in the war really predisposed to labyrinth trouble. Certainly nasal obstruction predisposed, mechanically. He suggested that what Mr. Mollison called "quantitative" deafness was due to an exhaustion of the auditory centres, not uncommon in neurasthenia. Traumatism had often produced an increase of chronic labyrinthine troubles, and mercuric chloride was of benefit in these cases.

Dr. W. J. Leighton (Manchester) said that syphilis as a cause was somewhat neglected; syphilis insontium was a thing not to be missed. He quoted a case which occurred in a surgeon who contracted the infection during an operation upon a varicose ulcer. The psychological factor was of importance. He had seen a labyrinthine storm, in a case of Eustachian obstruction, relieved by inflation. He emphasized the importance of the caloric tests in distinguishing between central and labyrinthine troubles.

The President said that the discussion had brought out the important points that in a considerable proportion of cases of internal ear deafness, evidence of middle-ear

disease was present. In his experience a negative Rinne and prolonged bone conduction in cases of chronic deafness with middle-ear disease were phenomena which were very far from being common; on the contrary, loss of bone conduction and a positive Rinne were very common indeed in such cases. It was his impression that many cases of so-called internal ear deafness would be proved some day to be due to disease in the foramen rotundum. It was an important and perhaps significant point that in all cases of hyperostosis of the external auditory meatus, where genuine obstruction of the meatus did not exist, there was deafness of the internal ear type. In regard to cases of toxic deafness, he wished to say that although he had lived for three years with an army soaked in quinine and in malaria toxins, he had met with no clear evidence of chronic deafness arising from these causes.

DISCUSSION ON RETROBULBAR NEURITIS OF NASAL ORIGIN.

OPENING PAPER

BY

EDWARD D. D. DAVIS, F.R.C.S.,

Surgeon, Nose, Throat and Ear Department, Charing Cross Hospital.

This paper is based on 54 cases of retrobulbar neuritis which were sent to me by ophthalmic surgeons for an examination of the nose with a view to ascertaining the cause of the condition of the eye. The following results were obtained after repeated nasal examinations and a thorough examination of the etiology of each case:

Syphilis	7
Disseminated sclerosis	3
Pituitary tumour	2
Septic teeth (?)	4
Septic tonsils (?)	1
Choroiditis	2
Leber's optic atrophy	1
Albuminuric retinitis	1
Tobacco and alcoholic amblyopia	1
Undoubted nasal sinus suppuration	4
Nasal disease excluded, but investigation as to cause incomplete	5
No cause ascertained	23

It will be noticed that only 4 cases out of 54 had nasal sinus suppuration. All 4 cases underwent operative treatment in which the middle turbinal was removed and the sphenoidal and posterior ethmoidal cells were opened. A dramatically rapid improvement in the sight was produced in 3 of the cases, and in the one remaining case the lack of improvement was considered to be due to optic atrophy. The lesion was unilateral, and the cause was suppuration of the posterior ethmoidal and sphenoidal sinuses. The maxillary antrum was also affected in 3 of the cases, but it must be remembered that the antrum is a cesspool for the nasal sinuses, and I believe that in those cases in which optic neuritis or retrobulbar neuritis have been recorded as the result of antral suppuration the ethmoidal cells were probably involved, and that the disease in this latter region was the real cause of the inflammation of the optic nerve. Suppuration of the antrum of nasal origin is practically always accompanied by suppuration in other sinuses, such as the frontal and ethmoidal. On the other hand, where antral suppuration arises from the teeth this cavity alone is involved, and optic neuritis or retrobulbar neuritis has never been recorded in such cases, nor have I seen it in the large number of dental cases which I have had under my care. Moreover, the anatomical position of the antrum makes it difficult to understand how suppuration in that cavity can affect the optic nerve; but at the same time it must be admitted that that indefinite condition toxaemia cannot be excluded. It is a striking fact that though severe nasal sinus suppuration is so common, yet it is rarely complicated by retrobulbar neuritis.

In these cases and others recorded, in which there was no doubt that the optic neuritis was caused by the nose, the nasal disease was obvious. There was a history of an offensive discharge from the nose of long duration, and the presence of suppuration and polypi was easily seen during an examination. This type of neuritis rapidly progresses to optic atrophy and permanent blindness, and the sooner the nose is treated the better. The improvement in sight after operation in the above cases was extremely rapid, and was confirmed by the ophthalmic surgeon. It was also permanent, the patient being kept under observation for more than twelve months. The condition of the eye was described by the ophthalmic surgeon as optic neuritis, and the fields of vision showed an absolute central scotoma, but there was no tenderness of the globe of the eye on pressure or on movement. In one case there was slight exophthalmos.

I have not seen any case of retrobulbar neuritis occurring during acute coryza or a cold, in spite of the fact that observation of cases of acute coryza is an everyday experience. In some of the cases in which no cause for the neuritis was found, the patient made the statement that the sight improved during a cold. Others developed colds during the period they were under observation, and there was no additional loss of sight and no symptom to indicate that the condition was in any way aggravated.

The anatomical relations of the sphenoidal and posterior ethmoidal cells to the optic nerve are familiar, and skilfully shown by these photographs by Professor Onodi. [Photographs exhibited.]

It is reasonable to suppose that the short intracranial portion of the optic nerve as it lies in the optic foramen and canal in the upper and outer angle of the sphenoidal and posterior ethmoidal cells is the portion of the nerve involved in nasal disease. The bony canal is very thin, and sometimes shows a dehiscence. The two outer dural and arachnoid fibrous coverings of the nerve are absent, and it is only covered by the pial sheath. The delicate papillo-macular fibres which supply the macular region lie to the temporal or outer side of the nerve away from the nose, and in cases of central scotoma it is these fibres which are involved. The periphery of the field of vision is supplied by the fibres which lie in the centre of the nerve trunk. The charts of the fields of vision in the nasal cases showed a large central scotoma, and the other so-called idiopathic retrobulbar cases demonstrated a definite contraction of the field and also a central scotoma. Unfortunately there are so many factors in perimetry which influence the charts that it is impossible to show that only the outer fibres were affected in the nasal cases and all the fibres of the nerve in the idiopathic cases; also the extent and severity of the neuritis must vary considerably in the different cases. It was hoped that the charts of the field of vision of the nasal cases would show definite characteristics and so be an aid to diagnosis, but, on discussing the charts with Mr. Basil Lang, who has made a special study of perimetry and scotometry, it was decided that no such simple conclusion could be drawn, nor was there any probability that such a distinction could be made by the perimeter.

The relations of the optic nerve to the sphenoidal and posterior ethmoidal cells of the nose are similar to that of the facial nerve and the middle ear, and it appears to me that this analogy can be carried further in the cases of retrobulbar neuritis. Paralysis of the facial nerve as the result of ear disease is most commonly due to the chronic and more destructive suppuration seen in tuberculosis of the mastoid or in cholesteatomatous suppuration of the middle-ear cleft, and I believe it is the more destructive chronic suppuration of the nose which produces retrobulbar neuritis. Professor Onodi, in his book *The Optic Nerve and the Accessory Sinuses of the Nose*, gives the pathological details of nine cases recorded by different observers in which optic neuritis was due to sphenoidal and ethmoidal suppuration with periostitis, osteitis, and necrosis, and confirmed by *post-mortem* examinations. The disease was extensive and destructive, and accompanied by meningitis, extradural abscess, or venous thrombosis. The optic nerve was affected by direct extension from the bone, or more rarely by venous thrombosis. It is only in a very few of the many cases of suppuration of the sphenoid and ethmoid that the optic nerves are

involved, and in this respect again the relation of suppuration of these nasal sinuses to the optic nerve is similar to middle-ear suppuration and the facial nerve. In all these cases the cause of the neuritis was definitely due to gross and severe suppuration of the sphenoid and ethmoid, and, though unilateral neuritis is considered to be more common and indicates a nasal origin, both nerves were sometimes affected, and it has been claimed that optic neuritis has been known to be due to sinus suppuration on the opposite side of the nose. For this and anatomical reasons, it is always advisable to open and drain the sphenoidal and posterior ethmoidal cells of both sides in cases of retrobulbar neuritis of nasal origin. It is true that acute otitis media occasionally produces facial paralysis, but there are a large number of cases of transient paralysis in which no cause can be found, and the paralysis disappears in a few weeks. In this respect facial paralysis resembles the 23 cases of idiopathic retrobulbar neuritis about to be discussed, the majority of which recovered.

The scrutiny of the 23 cases of retrobulbar neuritis for which no cause could be determined showed that these were of sudden onset and usually occurred in women under 40 in whom the nose was perfectly normal, and repeated examinations with exploration of the sphenoidal sinuses and antra yielded a negative result. In 3 of these cases the middle turbinals were removed, the sphenoidal and ethmoidal sinuses were opened and found to be normal, and there was no improvement in the sight as the result of this procedure. In another case the nose was not above suspicion, and, as there was no improvement, the sphenoid and ethmoid were opened and found to be absolutely normal. This case ultimately turned out to be disseminated sclerosis, in which the sight varied as in other cases due to the same cause.

In most of the 23 cases *x*-ray examination, Wassermann reaction, tests of urine and of the nervous system, and searches for tuberculosis were all negative, neither was there any evidence of toxaemia, and though the patients were seen at intervals for more than twelve months no further information as to the etiology was obtained. Nevertheless the sight improved or became normal. It is possible that an examination of the cerebro-spinal fluid may have thrown some light on these cases, but unfortunately lumbar puncture was not done.

Bruckner records ten cases of unilateral retrobulbar neuritis in which the sphenoid and ethmoid were examined and no nasal lesion was found. Other observers, particularly in America, report that a much greater number of cases of retrobulbar neuritis are due to nasal disease, and it may be claimed that some of the above idiopathic cases have a latent nasal lesion which cannot be detected macroscopically.

If the severity of the symptoms in a case of retrobulbar neuritis is progressing and every other cause for the condition is eliminated, or if there is the slightest suspicion of sphenoidal and ethmoidal disease, then it would be justifiable to remove the middle turbinal and open up the sphenoidal and ethmoidal cells; the risk of damage done by such procedure is negligible.

In conclusion, only 4 out of 54 cases of retrobulbar neuritis were produced by nasal suppuration, and in those 4 and in others recorded the suppuration and disease of the sphenoidal and ethmoidal cells was obvious and extensive. An improvement in the sight after the sphenoid and ethmoid have been opened and when little or no disease was found does not conclusively prove that the neuritis was caused by the nasal condition.

LITERATURE.

StClair Thomson: Optic Neuritis of Sphenoidal Sinus Origin, BRITISH MEDICAL JOURNAL, June 2nd, 1923, p. 925. Cerebral and Ophthalmic Complications in Sphenoidal Sinusitis, *Trans. Medical Society of London*, xxix, 1906.

Leon E. White: Aeration of the Posterior Accessory Sinuses in Acute Optic Neuritis, *Laryngoscope*, xxxii, May 22nd, 1922, p. 382.

DISCUSSION.

Sir STCLAIR THOMSON (London) said that at present there was a "boom"—the second one in twenty years—in the association between sinusitis and retrobulbar neuritis. He agreed with Mr. Davis that it was rare, and that it was orbital inflammation which was the common result of sinusitis, not ophthalmic inflammation. Surgeons ought not to operate upon the sphenoidal sinus on the supposition that it might cause retrobulbar neuritis although clinically it was healthy. The association was a rare one.

Mr. A. J. WRIGHT (Bristol) agreed with the opinion expressed by Mr. Davis. When the sinuses were the cause, this could be diagnosed by rhinologists. Unexplained cases were common, and they would all improve occasionally, with or without treatment.

Mr. T. RITCHIE RODGER (Hull) said that some cases of sinusitis were very difficult to diagnose. He quoted a case, diagnosed as cavernous sinus thrombosis and subjected to operation, in which, although pus and polypi were absent, relief followed four hours after the procedure of sphenoidal drainage. He felt certain that some unexplained cases arose from non-purulent sinusitis.

Sir J. DUNDAS-GRANT (London) discussed the anatomy of the associated parts, and quoted a case in which sphenoidal drainage relieved the pain, and in which the Wassermann reaction was positive.

Mr. SOMERVILLE HASTINGS (London) found that the association of retrobulbar neuritis and sinus disease was commoner than some of the previous speakers had said. He agreed with Mr. Ritchie Rodger that opening the sphenoid sometimes led to immediate improvement although no disease was found.

CANFIELD'S OPERATION ON THE ANTRUM:

DESCRIPTION AND RESULTS.

BY

SIR JAMES DUNDAS-GRANT, K.B.E., M.D., F.R.C.S.

WHEN referring recently to some cases as having been treated for their chronic suppuration in the maxillary antrum by "Canfield's operation" I was asked by a distinguished laryngologist what Canfield's operation was. I knew it only by this name, having made its acquaintance in Loeb's majestic *System of Operative Surgery of the Nose, Throat, and Ear*. It appeared to me to have such distinct and valuable features as to justify its being named after its putative deviser. The main feature in it is that the opening is made in the narrow anterior part of the antrum, close to the margin of the piriform orifice of the skull. This margin can be distinctly felt by a finger pressed into the naso-facial fold externally, while if the nose is tilted up and the naris is opened by means of a nasal speculum, not pushed too far in, a corresponding fold running nearly vertically can be seen or felt. The anterior part of the antrum, which is narrow, comes forward towards the edge, though at some little distance posterior and external to it.

FIG. 1.—Horizontal section of left maxillary antrum, showing the narrow anterior "foc'sle" to be opened in this operation.

The antrum being exposed at this anterior part it is easy to look straight into it or introduce an irrigating cannula in a way that no other intranasal operation permits of. It is likely also that the position of the resulting opening, situated as it is at a narrowed part of the nasal passage, allows of the production of negative pressure as the respiratory currents of air pass over it.

In Canfield's original paper (*Journ. Amer. Med. Assoc.*, vol. li, p. 1136) the operation is described as "the submucous resection of the lateral nasal wall in chronic empyema of the antrum, ethmoid, and sphenoid," and he appears to lay stress upon the mode of dealing with the

turbinated bodies rather than on the site of access to the interior of the antrum, which is, in my opinion, the essential feature of the operation. A few more details with regard to this latter point might have been given with advantage, and I venture to supplement Canfield's description by adding them in the form suggested by my experience.

For half an hour before the operation the vestibule and anterior part of the nasal fossa should be plugged with a 10 per cent. solution of cocaine hydrochloride in the full strength (1 per 1,000) solution of adrenaline, on ribbon gauze, or preferably non-absorbent cotton-wool.

At the operation (under a general anaesthetic) the head should be slightly raised as for the submucous resection of the nasal septum, and the posterior naris should be plugged. A nasal speculum—by preference Killian's shortest type—is introduced and turned outwards, so as to expose the outer wall of the vestibule of the nose. The cocaine plug having been removed, an intranasal incision is made with a short-bladed scalpel down the fold described above as corresponding to the margin of the piriform fossa. This should go down to the bone and hug its *outer* surface. Skillern removes an elliptical piece of tissue by making two incisions meeting above and below. A periosteum elevator is then introduced, and slid quickly up and down so as to detach the periosteum to the depth of about half an inch, carefully avoiding the infraorbital nerve. Then with the greatest decision a flat strip of gauze (two or three ply) is pushed between the bone and periosteum, the outer end being turned outwards over the cheek. The bleeding being thus checked, the nasal muco-periosteum is raised by means of a narrow elevator introduced through the same incision but on the *nasal* side of the bony edge. The elevator is then pushed inwards under the inferior turbinated body for about three-quarters of an inch (avoiding the orifice of the nasal duct).

To make a flap an incision is now made from the top of the original one down the whole of the anterior margin of the inferior turbinated body and for a short distance along its inferior margin the muco-periosteum is detached, and a portion of the turbinated bone resected by means of flat punch forceps. By a transverse incision across the roof and walls of the inferior meatus this muco-periosteal flap may be formed for insertion into the floor of the antrum when the opening is made.

The insertion of such a flap is not, however, of very great importance, and it will be found sufficient to remove the anterior third of the inferior turbinated body. A strip of gauze is now introduced so as to check the bleeding, which, if the preliminary adrenalization has been well carried out, is seldom great, though otherwise considerable.

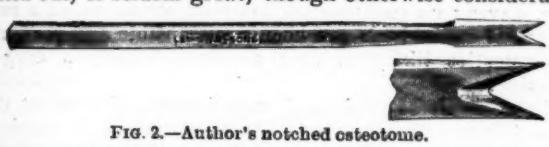


FIG. 2.—Author's notched osteotome.

The opening in the bone is now to be made. A Killian's speculum, usually the middle-sized one, is introduced through the original vertical incision with one blade on the facial surface of the bony ridge and the other on the nasal one. The ridge being freely exposed, a flat chisel or my notched osteotome, devised for this operation (Fig. 2), is introduced at the lower part with its cutting edge horizontal, pointing backwards and outwards. An assistant hammers on it with a leaden-headed mallet so as to cut into the bone for about the third of an inch. The chisel is then extracted and replaced at the upper part, level with the line of attachment of the inferior turbinal, and is driven into the bone to the same depth. An endeavour should now be made to unite the facial extremities of the two chisel cuts by a vertical one, which should penetrate the antrum, but as a rule the projecting wedge of bone can be gripped by means of bone forceps and broken off. With the forceps the opening can be enlarged both in the facial and the nasal direction, and the pus, polypoid swellings, and débris of bone removed by means of gauze swabs and curettes. The antrum can now be swabbed out with a 10-volume hydrogen peroxide, then with a 3 per cent. solution of zinc chloride, and a vaselined plug of gauze, preferably encased in a thin rubber finger-cot, introduced.

The margins of the opening (Fig. 4) may be trimmed with the bone forceps, especially the lowest part of the nasal side, which should be cut down as near to the floor of the nose as possible. If a muco-periosteal flap has been made,

FIG. 3.—Diagram showing notched osteotome applied to margin of piriform orifice.

FIG. 4.—Diagram showing amount of bone removed.

the plug should be removed and the flap pushed into the floor of the antrum, the plug being renewed. In twenty-four hours this plug is removed, and as a rule it need not be replaced.

The following are notes of a consecutive series of cases in which I have operated by this method:

CASE I.

Margaret H., aged 18, applied for treatment at Brompton Hospital on account of increasing debility and depression; she was found to have discharge from the left nasal cavity which had existed for three years; she had weekly washings out of the left antrum for a couple of months without cessation of the discharge. Almost immediately after the carrying out of Canfield's operation the discharge ceased completely, there was no fetor, and she felt well.

CASE II.

Harry W., aged about 40, had suffered from frontal headache for two and a half years and nasal discharge on both sides. On the right side pus was present between the septum and the anterior lip of the hiatus, and on the left side between the septum and the middle turbinal. The opening into the frontal sinus from the nose on the right side was obstructed, but on the left one free. A quantity of fetid pus was washed out of the right antrum by Lichtwitz's method, but on the left no pus was found in the antrum, though some could be washed out of the frontal sinus. The head was relieved by the washing out of the right antrum and of the left frontal sinus; at a later period the headache was confined to the right side, and continued until the Canfield operation was carried out. When seen ten days later he reported that he had complete freedom from pain and heaviness in the head, and that his nose was quite clear.

CASE III.

Colonel — complained of fetid discharge on the left side of the nose of over two years' duration; pus was found in the right antrum, and two days later the antrum was opened by Canfield's method. Within a few days after the operation the suppuration had stopped.

CASE IV.

Reuben P., aged 34, had been rejected from the army on account of signs at the right apex but with absence of bacilli in the sputum. He was sent to Brompton Hospital for Consumption on account of pain in the chest, cough, and expectoration. He was referred to the throat department, where the right maxillary antrum was washed out, after which the pain in the chest disappeared; he was conscious of nasal obstruction and an offensive smell in his nose; there was a deflection of the septum and hypertrophy of the right middle turbinal. The washing out of the antrum was repeated on several occasions, and fetid pus was always evacuated. The radical operation by Canfield's method was carried out early in 1922; the suppuration then disappeared and his chest was soon so clear that it was considered unnecessary for him to attend further. Signs of obstruction in the right nasal cavity were relieved by removal of the middle turbinal.

CASE V.

Jessie G., aged 28, complaining of cough and pain on the left side of the chest, was found to have nothing definite in the lungs nor any bacilli in the sputum; she had pain in the left frontal region and discharge in the left side of the nose, with an unpleasant smell of which she was conscious. The left antrum was opaque on transillumination, and when washed out was found to be full of fetid pus. In spite of repeated washing out the discharge of fetid pus continued, and the Canfield operation was carried out. In a week's time she was free from headache and discomfort and also from suppuration, except what appeared to be a slight oozing from the frontal sinus.

CASE VI.

Matt. R., aged 32, complained of fetid purulent discharge from the nose confined to the left side, of four years' duration, accompanied by left frontal headache. Transillumination showed opacity of the left antrum, and Lichtwitz's puncture gave vent to a quantity of fetid pus. The middle turbinal was enlarged, and the anterior part of it removed so as to free the infundibulum and the orifice of the antrum. This was followed by relief to the headache, but repeated punctures showed no diminution of the amount of pus. Canfield's operation was performed, and in a few days the purulent discharge had completely disappeared. A small mass of granulations developed on the anterior margin of the opening, which interfered with the introduction of a cannula, but after this was removed there was no further difficulty.

CASE VII.

Mr. F. L. B., aged about 50, was the subject of a paper read by me at the Newcastle meeting of the Association, as a "case of suppuration in a subdivided maxillary antrum with 'nasal ganglion neurosis,' suggesting malignant disease: operation followed by recovery." In this case there was intense pain; the antrum was translucent on transillumination, and no pus was washed out by means of Lichtwitz's trocar and cannula. Canfield's method of operation was employed, and the anterior part of the cavity was found free from pus or new growth; there was, however, a vertical bony partition shutting off the posterior part of the cavity; this was broken through by means of a strong spoon, giving vent to a quantity of soft granulation-like tissue, bathed in pus; convalescence was retarded by a streptococcal infection which yielded to injections of antistreptococcal serum, and recovery was complete. The patient found no difficulty in washing out the antrum through the convenient opening afforded by this operation. Further details and skiagrams will be found in the *Journal of Laryngology and Otology* for February, 1922.

CASE VIII.

Nellie D., aged 25, who had suffered for a number of years from pulmonary trouble, with cough and profuse expectoration, was referred to me in May, 1921, on account of a purulent discharge from the left nasal cavity. I did not see her again till September, 1922, when an alveolar puncture was made and pus washed out. In February of the present year there was still fetid pus in the left antrum. Canfield's operation was at once performed. Some discharge still continued to flow, but this was found to come from the frontal sinus, and it disappeared after removal of the anterior part of the middle turbinal and the washing out of the frontal sinus with argyrol on three occasions. An accompanying headache on the left side disappeared, and the physician reported such great improvement in the chest conditions after the treatment of the antrum that further attendance on that account was unnecessary. The left antrum is now quite dry, and on transillumination quite translucent.

In this case, for the first time, I have made use of the notched osteotome, having experienced the tendency of the straight-edged chisel to slide off the sharp ridge of bone.

CASE IX.

Mrs. W., aged 55, was operated on through the nose a number of years ago, before the adoption of the Canfield method, on account of chronic suppuration in the left maxillary antrum. There was still a discharge of pus, and it was proposed to perform Canfield's operation on the antrum. In May, 1922, she developed suppurative inflammation in the right antrum with extreme pain and headache. In July I performed Canfield's operation; the pain disappeared at once, and the suppuration ceased in a few days; it has not returned, and the opening into the antrum is still patent.

CASE X.

Mr. J. W., aged 38, was operated on in 1912 by the old intranasal method for chronic empyema of both antra. The right one settled down completely, but the left one continued to discharge. I performed Canfield's operation, and at once the headache and mental depression from which the patient suffered disappeared completely. In this case the antrum contained a number of polypi. The discharge disappeared almost at once.

In this case the operation was facilitated by the use of the notched osteotome.

The enormous improvement in general health which follows this operation has certainly done so in other forms of radical procedure, but in none—in my own experience—has the improvement been so rapid.

I may mention that exception has been taken to this operation on account of the amount of bleeding, which was extremely troublesome in my earlier cases. Since the adoption of the methodical cocaine-adrenaline preparation insisted on by my friend Mr. Clayton Fox, and the "decided" insertion of the gauze strip on the facial surface of the bone, this has become quite insignificant.

Though this may be considered a rhinologist's operation, I venture to think that the details I have here given will place it within the scope of others. Its efficacy may well be tested in cases in which the more usual methods have failed to give complete satisfaction, and I have every confidence as to the result.

BUTYN AS A LOCAL ANAESTHETIC IN NOSE AND THROAT PRACTICE.

BY

WILLIAM HILL, M.D., B.Sc.,

Consulting Surgeon for Diseases of the Throat, Nose, and Ear to St. Mary's Hospital, and Endoscopic Surgeon to the Metropolitan Ear and Throat Hospital.

ALTHOUGH the alkaloid cocaine was isolated from the leaves of the coca plant so far back as 1860, it is only during the last forty years that it has been generally used as a local anaesthetic in the form of its most soluble salt, the hydrochloride. In the early days of its employment serious toxic and even fatal effects were occasionally reported, and this soon led to efforts to discover any equally efficient local anaesthetic substance considerably less toxic than cocaine and free from those exhilarating properties which have resulted in its becoming a drug of addiction; thus during the final decade of the last century the synthetic alkaloidal substances eucaine, stovaine, and orthoform were brought out, to be followed early in the present century by anaesthesine and novocain, to mention only some of the more widely employed local anaesthetics.

These agents, however, whether on account of their salts being sparingly soluble in water or of their transitory effects, failed to displace cocaine entirely. The hydrochlorides of eucaine, novocain, and stovaine proved reliable anaesthetics for infiltration anaesthesia by injection in weak solution, and comparatively free from toxic effects, and they have supplanted cocaine in this method of local anaesthesia. Again, the very sparingly soluble powders, orthoform and anaesthesine—both benzoates—have proved useful local anaesthetics for insufflating on to ulcerated surfaces in cancer and tuberculosis of the throat.

For the production of local anaesthesia by surface application to mucous membranes as a preliminary to surgical procedures none of the above substances, however, proved really efficient, and cocaine hydrochloride remained not only pre-eminent but the only possible local surface anaesthetic for surgical requirements in the nose, throat, and elsewhere.

With the full recognition that caution must be used in the employment of much cocaine for surface anaesthesia and that toxic effects occur in certain susceptible individuals, they are occurrences of extreme rarity and fatal results have apparently been conspicuous by their absence in recent years. Cocaine having been superseded in infiltration anaesthesia by substances far less toxic and equally efficient, it may be confidently expected that it will one day be supplanted as a mucous surface anaesthetic by the discovery of a substance which is equally efficient but far less generally toxic, having no such special toxic effects to which a small number of individuals are keenly susceptible and possessing no properties likely to lead to its becoming a drug of addiction.

As the result of prolonged experiments, the expert staff of the Abbott Laboratories of Chicago, working in collaboration with Professors Adams and Kamm of the University of Illinois, have produced a synthetic substance—butyn—which is readily soluble, and which, it is claimed, fulfils most of the requirements of a safe and efficient cocaine substitute.

Butyn is not a cocaine derivative, and there are therefore no restrictions as to its purchase, but, like the other local anaesthetics mentioned above, it is chemically *related* to cocaine, as will be seen from the following table.

Ethyl series:
- (1) Novocain = Para-amino-benzoyl-di-ethyl-amino-ethenol hydrochloride.
- (2) Anaesthesine = Para-amino-benzoic-ethyl-ester.

Methyl series:
- (3) Cocaine = Methyl-benzoyl-ecgonine.
- (4) Eucaine = Trimethyl-benzoxy-piperidin hydrochloride.
- (5) Orthoform = Methyl-amino-oxy-benzoate.

Butyl series:
- (6) Butyn = Para-amino-benzoyl-gamma-di-n-butyl-amino-propanol sulphate.

A committee appointed by the American Medical Association reported early in 1922 very favourably on butyn, as the result of extensive investigations of its clinical employment, more especially in eye work. Beaumont of Bath con-

tributed a paper to the BRITISH MEDICAL JOURNAL in January of this year confirming from his own eye practice the favourable impressions received from America. Bulson and others in the United States have also used butyn extensively in nose and throat practice, as a surface anaesthetic, with fairly good results.

The claims made for butyn are as follows:

1. It is a powerful local anaesthetic, being about twice as potent as cocaine, so that a 5 per cent. solution of butyn suffices in nasal surgery, for example, where a 10 per cent. solution of cocaine hydrochloride would be necessary.
2. Butyn acts more quickly than cocaine and its effect lasts longer. This I can confirm, but it is only an advantage amounting to a very few minutes, and it is of little practical importance.
3. It is less toxic than cocaine; possibly only half as toxic dose for dose, and as only half the quantity of the drug is necessary its toxicity in practice is still further reduced. The point of real practical importance is that although butyn has been employed many thousands of times in America, more especially by ophthalmologists, no record of any serious toxic complications appear to have been reported up to now.
4. It has no ischaemic effect when applied to mucous surfaces. This may be an advantage in eye work, but, as will be pointed out later, is a decided disadvantage in nasal practice.
5. It can be boiled without impairing its anaesthetic potency, and it does not deteriorate on keeping, as does cocaine.
6. It gives rise to no exhilarating and pleasing effects, and is therefore not likely to excite craving and become a drug of addiction.

I find the *disadvantages* of butyn are as follows:

1. On the appearance of Mr. Beaumont's paper more than six months ago I purchased some butyn, and was at once confronted with one of the drawbacks to the employment of this drug, as the price was 6s. a gram in powder and 6s. 6d. in tablet form; that is to say, the cost is at present five times that of cocaine, and even taking into consideration the fact that a gram of butyn goes as far as two grams of cocaine hydrochloride, butyn is two and a half times as expensive to employ at the present time.
2. Cocaine hydrochloride is a very reliable surface anaesthetic for mucous surfaces, although inflamed surfaces require a longer application and may demand an increased percentage solution; on the other hand, *butyn is not uniformly reliable*. It was not until my seventeenth observation with butyn that I found it quite failed, in spite of renewed applications in that case, to render the mucosa of the septum sufficiently insensitive to tolerate the galvano-cautery. Beaumont made no mention of this occasional failure of butyn to anaesthetize. There is a French aphorism which advises that in the case of a new remedy we should hurry up and employ it whilst it continues to act. On referring to Bulson's report I find that others have noticed that certain individuals, not a large number probably, have failed to respond to butyn. I have had to resort to cocaine in addition on at least four occasions during the last six months, which represents about a 5 per cent. failure in my nasal series. This is to my mind a serious drawback, and in marked contrast to the reliability of cocaine hydrochloride.
3. The most disadvantageous characteristic of butyn as far as the rhinologist is concerned is that it not merely fails to produce ischaemia of the mucosal vessels and general shrinking, but that it has a tendency to bring about hyperaemia and tumefaction. In many rhinal procedures, whether for examining or other purposes, reduction of tumefaction of the mucosa is as essential as anaesthetization. It is recommended that an ischaemic effect can readily be obtained by adding adrenaline, or some similar suprarenal product to the butyn solution. No rhinologist, however, needs to be reminded that adrenaline has in many individuals, and especially in inflammatory conditions in the nose, an extremely irritating action, sometimes causing an intense coryza most distressing to the patient and lasting two or three days. Since I have been testing the effects of butyn reinforced by adrenaline solution I have produced such a distressing coryza on several occasions. For operation under local anaesthesia on the sinuses and on the septum and for the removal of polypi this complication cannot be provided against by using cocaine hydrochloride instead of butyn, because for haemostatic purposes we are accustomed to reinforce the ischaemic effect of cocaine by the addition of adrenaline, and as large surfaces have to be anaesthetized in the above-named procedures we have here a useful field for the employment of butyn instead of cocaine hydrochloride so as to minimize the chance of toxic effects occasionally incidental to exhibiting a considerable quantity of 10 per cent. solution of cocaine hydrochloride. It has been already pointed out, however, that marked toxic effects following the use of fairly large amounts of cocaine hydrochloride solution up to 10 per cent. potency are of extreme rarity, and that such a complication depends far more on intolerance to cocaine in exceptional individuals than on the actual amount of cocaine applied to mucous surfaces and liable to be absorbed. In vasomotor rhinitis and in the rhinitis of influenza and similar acute and subacute conditions where the ostia of the sinuses are liable to become blocked and where application of weak solutions of cocaine hydrochloride often affords an immense amount of relief by anaesthesia and ischaemia, adrenal preparations are contraindicated on account of the irritation and hyperaesthesia being thereby intensified, so that for these conditions butyn finds no useful field of employment.

In my rhinal practice the application of butyn solutions has recently been almost entirely restricted to galvano-cautery applications to the septum and to the inferior turbinals, but even here, except in individuals who are proved to be especially susceptible to cocaine, it is doubtful if anything worth mentioning is gained by using this expensive agent.

What has been said in reference to the shortcomings and restricted field of usefulness of butyn in the nose applies in a somewhat lesser degree to the pharynx and larynx, which are not so susceptible to irritation by adrenaline. I have on two occasions failed to get sufficiently good anaesthesia with butyn to carry out with comfort to the patient galvano-cautery to the base of the tongue for the relief of paraesthesia. My use of butyn in the throat has not been very extensive owing to my increasing loss of confidence in the drug on account of its occasionally proving unreliable.

In conclusion I must record my opinion that butyn cannot claim to be a reliable and efficient all-round substitute for cocaine in nose and throat practice, but it is a useful alternative in a few conditions, more especially where cocaine is contraindicated.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

HYDROCEPHALUS FOLLOWING SPINA BIFIDA.

A TWIN, aged five weeks, was admitted to the General Infirmary, Leeds, with a large thin-walled meningocele in the lumbar region. Both legs were paralysed, the one quite flaccid, the other showing some resistance to movement. There was a suspicion of condylomata in the anal region, and the facies suggested a syphilitic taint, but the family history was good, and the other twin to all appearance healthy.

At operation it was found that all the lumbar laminae were wanting, and that the cord was lying on the posterior surfaces of the vertebral bodies. The sac was excised. In the belief that spina bifida is a symptom and not simply a congenital defect, I threaded silkworm sutures from the subdural space into the erector spinae muscles, hoping that thereby the cerebro-spinal fluid would drain off into the muscular spaces. The wound was then closed, but remained unhealed for about two weeks, during which time it discharged cerebro-spinal fluid copiously.

Rapid healing now began, and after three days hydrocephalus developed. As the condition was causing great pain, it was decided to drain the lateral ventricle. I made a curved incision over the parietal bone about one inch above the external auditory meatus. A portion of the bone was removed with scissors, and a crucial incision into the dura made. The brain, thus exposed, was unduly moist. A bundle of short silkworm sutures were thrust into the ventricle, and a large amount of cerebro-spinal fluid welled up. The bundle was secured to the cerebral surface of the dura mater, and the skin drawn together with silkworm sutures. The cranial bones at first moved curiously on each other, but twelve hours later the skull had consolidated. The operation apparently gave relief from the pain, and there was no return of the hydrocephalus during the three weeks following. The spina bifida wound remained closed. One week after discharge the child died. No particulars were obtainable.

The rapid development of hydrocephalus following the healing of the spina bifida wound is a strong argument in favour of the theory advanced by Mr. John Frazer and others, that spina bifida should not be regarded as a purely local defect, but as the sign—in the cord—of increased pressure of the cerebro-spinal fluid. The cause of this increased pressure is probably some interference with its outflow, possibly by adhesions.

My thanks are due to Mr. L. R. Braithwaite for permission to operate on this case, and to publish this account.

A. P. BIRTWISTLE, M.B., Ch.B.,
Late Resident Surgical Officer,
Leeds General Infirmary

A SPORADIC CASE OF MYOCLONUS MULTIPLEX.

THE following notes on a man who was stated to have delusions and hallucinations may be of interest.

J. W., aged 56, was admitted to the Littlemore Mental Hospital on September 20th. On admission he was in a condition of stupor. The temperature, pulse, and respirations were normal and remained so throughout the course of the disease. Marked myosis and the Argyll Robertson pupil were present. The consensual and sympathetic reflexes were absent. The biceps and triceps reflexes were absent. The abdominal reflexes were brisk. The abdominal wall was rigid and hyperaesthetic. The knee-jerks and ankle-jerks were absent. Indefinite Babinski and Oppenheimer signs elicited on the right side; on the left the plantar reflex was normal. Both protopathic and epicritic sensibility were increased in both legs, and more especially in the right foot. Myokymia and myotatic irritability were well marked.

Convulsive attacks of a myoclonic type occurred on the second day. The muscular contractions started in the legs or abdominal wall, and soon became generalized. They were regular, rhythmical, and forcible, and occurred at the rate of thirty to forty a minute. Each seizure lasted from three to four minutes. The left pupil now dilated slightly and reacted sluggishly to light. Signs of a transient meningismus now appeared—slight head retraction and Kernig's sign, the latter being more definite on the right.

A fortnight after admission the stupor was less profound and the patient answered questions with a feeble stammer. The pupils were of normal size and reacted to light and accommodation. The meningismus and myoclonus had passed off. The abdominal reflex was now absent on the right side, and the Babinski and Oppenheimer signs were quite definite. There was slight frontal headache. The white cell count was 8,756 per c.mm. A differential count showed a slight relative increase of the polynuclear type. The cerebro-spinal fluid was clear and under normal pressure. A cell count of the centrifuged deposit showed two mononuclear cells per cubic millimetre.

The Lange colloidal gold reaction was negative, as was the Ross-Jones test for globulin. Twenty-four-hour cultures at 37° C. were made from the centrifuged deposit on blood serum and agar with negative results.

The patient is under treatment by intestinal antiseptics and full doses of hexamine and appears to be gradually improving.

Littlemore, Oxford. J. CAMPBELL RAMSAY, M.B., B.Ch.

FACIAL PARALYSIS FOLLOWING HERPES FACIALIS.

I DESIRE to record a case of facial paralysis following herpes similar to the case of herpes zoster with muscular paralysis reported in the BRITISH MEDICAL JOURNAL of June 9th, 1923 (p. 970).

A. L. R., sanitary inspector, Bengali, Hindu, aged 33, went on duty on a long and arduous bicycle journey on March 28th, 1922, when he received a severe wetting. On his return at night to headquarters he had headache with slight fever (100° F.), for which he took 10 grains of quinine and 5 grains of aspirin.

On the following day an attack of herpes facialis developed, affecting the pinna and external meatus of the left ear, together with the skin in the neighbourhood of the mastoid eminence.

On April 3rd, on awaking in the morning, he felt giddy and subsequently noticed that his face was drawn to one side. On medical examination it was found that he was suffering from well marked facial paralysis. He was unable to shut his left eye, to whistle, or to chew food properly. His sense of taste was also defective, as well as his sense of hearing on the affected side. These symptoms were accompanied by vertigo with a tendency to fall to the left, which in the event proved to be so severe and persistent as to incapacitate him from work for over five months. There was also a very considerable degree of sleepiness and mental hebetude, and a sense of general physical weakness.

Slight facial paralysis still persists after more than one year's convalescence, with some impairment of former mental acuity. A feeling of vertigo and pain in the left parietal region is also experienced on exertion, especially after cycling.

The sleepiness and mental dullness noticed in this case are particularly interesting in view of the close relationship stated by French investigators to exist between the virus of herpes and that of encephalitis lethargica.

Asansol, Bengal. J. W. TOMB, M.D., D.P.H.

Reports of Societies.

SPINAL ANALGESIA.

AT a meeting of the Section of Anaesthetics of the Royal Society of Medicine held on November 2nd, with the President, Dr. A. L. FLEMMING, in the chair, Dr. HENRY FEATHERSTONE communicated a critical report on 100 cases of spinal analgesia with tropacocaine. The paper dealt with the selection of cases, the administration of the drug, the condition of the patient, the local effects of the drug at operation, and the ultimate progress.

Discussing the selection of cases, he said he had never been wholly convinced that spinal analgesia, where its employment was permissible, was as satisfactory as general anaesthesia, owing to mental distress on the part of the patient and lack of his co-operation, the possible failure to insert the needle, especially in the obese and in the deformed, the possible deterioration of the drug, the limitation of the time available for operation, and the added strain on all the theatre workers. The series included cases suffering from prolonged or severe trauma 26, toxaemia or shock from intestinal obstruction, etc., 6, acute shock from trauma 2, lung affections 15, affections of air passages 6, pre-operative exposure to infectious colds 3, obstruction of larynx by enlarged thyroid 2, tuberculosis 5, heart disease 6, venous thrombosis of thigh and pelvis 1, albuminuria 2, diabetes 2, eclampsia 2, senility 3, enfeebled general condition 2, Caesarean section 12, uterine haemorrhage 1, objection to general anaesthesia 7.

In regard to results, one patient with crushed lower limbs died and the other recovered, but this type of anaesthesia was rarely employed for such cases owing to the dangers of a falling blood pressure. Pneumonia developed in 2 cases with respiratory affections and both recovered, but these served to show the importance of blood loss and abdominal shock in determining the onset of pneumonia, for both cases had lost much blood. In 6 cases of grave prognosis owing to prolonged intestinal obstruction, strangulation of bowel, and intra-abdominal sepsis, no harm was done by the injection, but shock was not eliminated, especially in the upper abdominal cases. The 5 tuberculous cases all did well, as also did the 6 cardiac cases. The drug gave an excellent result in the case of thrombosis of the pelvic and thigh veins, as the risk of post-operative movement was minimized thereby. The toxaemic cases, albuminuria, diabetes, etc., showed excellent results, and emphasized the importance of a non-toxic method of treatment. The senile cases also were satisfactory, as were the cases in which a general anaesthetic was refused.

Discussing administration, Dr. Featherstone said he preferred to have the patient on his side for the injection, especially as the sitting posture was often contraindicated in these cases. He used a 5 per cent. solution of tropacocaine in normal saline, and varied the dose with the dimensions of the vertebral canal, the level of the anaesthesia required, and the duration of the operation—for example, a big man to be operated upon for an hour below the umbilicus would require 2.5 c.cm., whereas a boy of 8 years, if given 1.5 c.cm. would have high anaesthesia for one and a half hours. The ethyl chloride spray dulled skin sensation sufficiently for incision, and was preferable to nitrous oxide, which caused rigidity of the erector spinae muscles, with consequent difficulty in finding the intravertebral space. The cerebro-spinal fluid must enter the barrel of the syringe before injection, or some of the drug would be lost in the epidural space; the injection should be made through the second lumbar space. There were three causes of the extension of the analgesic area upwards: (1) the drawing off of a considerable quantity of cerebro-spinal fluid, (2) inclining the body with the head downwards, and (3) rapid injection of the drug. In the present series, with a minimal release of cerebro-spinal fluid, 3.5 per cent. of patients developed headaches, whereas with a greater release 78 per cent. complained of this after-effect. Where combined anaesthesia was employed no headache was complained of. The author also cautioned his hearers against the too free mixing of the drug in the syringe with the cerebro-spinal fluid before injection, as in one case where he had done this vomiting, acetone in the breath and urine, and shock lasting for two days resulted. He suggested that the diffusion and dilution of the drug led to more rapid absorption and hepatic shock. Sudden movement caused a more rapid fall in the blood pressure than did gentle movement, but if the patient were gradually lowered analgesia up to the sixth dorsal vertebra could be obtained without discomfort. In the flat position this would extend only up to the umbilicus. Seven deaths occurred among the series, but none died on the table and only

one immediately after operation; the highest mortality occurred amongst the high abdominal cases. As a rule Dr. Featherstone gave gas and oxygen when the effects of the drug were beginning to wear off, and in cases where the Trendelenburg position was needed. Occasionally a little ether might have to be added.

In regard to the site of operation, those needed above the colon were best carried out under general anaesthesia. Patients with adhesions of the small intestine showed more distress than those in whom such adhesions were absent. Pulling on the intestines might cause vomiting and even pain, though the patient was usually unable to localize this. Stimulation of the diaphragm caused distress unless the cervical cord was anaesthetized. The action of the lumbar analgesia on the pregnant uterus was of great interest. There was tonic contraction of the body and cervix, though the circular fibres alone seemed to take part in this. Pain was absent and loss of blood slight. The progress of the foetus downwards was slow until the drug began to wear off and the longitudinal fibres started to contract. Then the child could be readily and painlessly expressed, and if necessary the placenta also. The pain sensation was the last to be recovered. On the other hand, dilatation of the non-pregnant uterus became increasingly difficult, as the cervix tended to contract after each instrument was passed.

The drug caused a fall of blood pressure; the minimal fall recorded by the author was 15 mm., the maximal 70 mm., but this last was probably due to the table being tilted too quickly. Post-operative treatment consisted in keeping the bed horizontal, with the patient's head on pillows, and the legs well raised. Immediate untoward after-effects were extremely rare. Remote after-effects showed headache in 40 per cent., and giddiness in the enfeebled cases. Of the 40 cases with headache 39 were women.

The author's conclusions were as follows: (1) Patients suffering from diseases of lungs, heart, kidneys, chronic toxaemia and diseases of metabolism may well be treated by intrathecal methods. (2) The presence of acute traumatic shock is a contraindication. (3) The method does not prevent abdominal shock associated with severe handling of a viscus above the colon without very high paralysis. (4) Exhaustion from manipulation of the pregnant uterus in labour and of the pelvic organs in general is rarely seen. (5) Association with light general narcosis is most helpful. (6) Early post-operative headache rarely occurs with tropacocaine, provided that there is little loss of cerebro-spinal fluid. (7) The most careful handling of these cases is needed if a considerable fall in the blood pressure is to be avoided. (8) Late complications attributable to the spinal anaesthetic are extremely uncommon in the absence of infection.

Discussion.

Mr. H. BECKWITH WHITEHOUSE was of opinion that surgeons who gave their own spinal injections had wandered into the domain of the anaesthetist. He believed in team work, and that necessitated the employment by the surgeon of an anaesthetist whom he could trust and who was familiar with the surgeon's idiosyncrasies. He had no doubt that in all operations on the pregnant uterus the employment of tropacocaine by the spinal route practically eliminated haemorrhage. He also had noted that his results were better since he had employed the drug in Wertheim's operations, in large resections of the vulva in old women for such diseases as leucoplakia, and in cases of pregnancy with advanced cardiac disease. The contraindications were obesity, pelvic inflammation, normal labour, and certain conditions of abnormal labour where such proceedings as version were required.

Dr. F. E. SHIPWAY questioned whether the results obtained in war surgery really showed the unsuitability of spinal analgesia in cases of shock. Work during the war was for the most part hurried, and too large doses were apt to be given with the mistaken idea of hurrying the onset of anaesthesia. He suggested that Dr. Featherstone's doses were very large, and, as the result of his own experience with stovaine, advised him to try the effects of a smaller dose. He then showed on the epidiascope diagrams taken from actual cases illustrating the smaller fall in blood pressure where smaller doses of the drug were given. He usually administered small doses of a C.E. mixture along with the spinal injection. In cases of prostatic resection in old men, he found the combined spinal and inhalation method very satisfactory.

Dr. R. E. APPERLY said that the patient ought to be kept in the Trendelenburg position until the effect of the spinal injection had worn off. Such was his practice with hospital cases, but in private it was more difficult to ensure this being done and it was often necessary to devise expedients to that end.

Dr. C. F. HADFIELD inquired why Dr. Featherstone used tropacocaine. He thought spinal injections should be made under scopolamine-morphine narcosis. To illustrate how easy it was for false deductions to be made, he mentioned a case in which, while the surgeon was dissecting out a large malignant growth of the bladder, the effect of the spinal injection wore off, and he was forced to continue with a little chloroform. Bleeding became more profuse, and he was promptly reprimanded by the surgeon for using ether! One of the drawbacks of spinal analgesia was the tendency of certain patients to retch and vomit after the drug had been administered. As a rule this passed off quickly, but it was a distinct hindrance to the surgeon if it occurred while the operation was in progress, owing to the violent extrusion of the bowels from the wound while the abdominal walls were in a state of complete relaxation. So far as the uterine muscle was concerned he had not been able to notice any difference, as regards bleeding, between the effects of a spinal injection and of a general anaesthetic. His experience of the duration of a spinal anaesthetic was that the analgesia lasted on an average forty minutes, but in certain cases it might be prolonged to one and a half hours.

Dr. HUGH PHILLIPS said that he refused to give a spinal injection without a preliminary general anaesthetic in small amount. His experience of the onset of headache after such injection was the opposite of that of Dr. Featherstone, with regard to the amount of fluid drawn off. He found scopolamine-morphine distinctly useful when dealing with women but unreliable in men. As regards children spinal injections after an extensive trial had been given up at Great Ormond Street. In parturition there was a difficulty in removing the placenta after a spinal injection.

Dr. C. H. M. HUGHES had had two deaths in diabetic patients following the use of a heavy stovaine solution. He had since used a lighter solution with better results in such cases. He attributed the high percentage of headaches in Dr. Featherstone's cases to the fact that no general anaesthetic was given. He believed that a C.E. mixture ensured the most tranquil anaesthesia and he administered it after the injection had been given. He believed also that heavy solutions were apt to cause headaches, for he had had no such complaints since he had taken to using lighter solutions.

Dr. W. J. MCCARDIE said that vomiting and collapse during spinal analgesia were often the result of the surgeon pulling on the small intestine. He did not think that the contraindications to spinal analgesia were sufficiently emphasized by the opener of the discussion. These consisted chiefly in the presence of myocardial disease and low blood pressure. His experience was that tropacocaine was less toxic than stovaine.

Dr. L. K. THOMAS questioned, at the risk of being dubbed unpatriotic, whether the tropacocaine now used in this country was as powerful and as certain in its effects as that of German origin used before the war. He did not find a general anaesthetic necessary before the insertion of the needle. All that was necessary was to numb the skin with the ethyl chloride spray, and it could then be painlessly incised with a sharp-pointed bistoury, and the needle inserted without inconvenience to the patient.

Dr. FEATHERSTONE, in reply, said that he used tropacocaine in all the cases of this series as he wished to compare his results after carrying out a uniform method of injection. He found this drug very satisfactory. So far from believing the English preparation unreliable, he quoted an authority who had used the German preparation extensively before the war, and had found that the ampoules dispatched from the German factory varied not only in the quantity of the solution contained in the ampoule, but also in the strength of the solution; and it was to overcome these defects that the authority in question prevailed upon a British firm to undertake the preparation of the drug as now used. He then replied seriatim to the points raised by the various speakers.

ANCIENT CHINESE MEDICINE.

At a meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine held on October 26th, with Dr. R. J. Reece, the President, in the chair, Dr. W. Perceval Yetts read a paper entitled "Pestilence and leechcraft in ancient China." He discussed a period stretching from 5,000 years ago down to the third century of our era. The beginnings of Chinese medicine, he said, went back far beyond the range of authentic history. Accordingly Dr. Yetts, without attempting to sift fact from myth and legend, gave the current traditions attributing the art of healing, like other fundamental achievements of civilization, to the three great culture-heroes of the race—the Emperors Fu Hsi, Shên Nung, and Huang Ti. He next read a translation of the opening passage of what was probably the oldest medical treatise extant in China. Therein the chief medical adviser of Huang Ti deplored the general physical and moral decadence of society as it existed more than twenty-six centuries B.C. Dr. Yetts went on to describe the elaborate State medical service under the Chou dynasty, which flourished for eight and a half hundred years from the twelfth century B.C. An interesting circumstance was the use by the Chinese at those remote times of antiseptics for the treatment of infected wounds. The account included two other government departments concerned with preserving the public health of ancient China. They comprised the court wizards and the court exorcists; and it was shown that their successors still, after some 3,000 years, function as protectors against the demons of disease. The standard of qualification and the status of medical men were next discussed. Apprenticeship and the acquisition of approved prescriptions were the recognized methods of preparing for professional practice. The status then was no better than in less ancient times. In the Chou period doctors were classed with a number of others "who professed particular arts for the service of their superiors." The list ran as follows: "Prayer-makers, writers, archers, carriage-drivers, doctors, diviners, and artisans." The earliest undoubted mention of an epidemic referred to one which occurred in B.C. 243; it did not specify the nature of the disease. Some famous doctors of antiquity were next passed in review. There was a legend of an operation performed under an anaesthetic as early as the fifth century B.C., and a more authentic account of a similar event is assigned to the third century A.D. Probably hemp was the drug. After speaking of methods of diagnosis, Dr. Yetts outlined forms of treatment under the headings drugs, diet, acupuncture, and physical exercises. The paper ended with a few words about the bibliography of ancient medical literature in China. The paper was illustrated with lantern slides.

A discussion followed in which the President, the Chinese Minister, Dr. Culpin, Dr. J. C. McVail, Sir Denison Ross, Dr. Major Greenwood, Dr. Lee, and Fleet Surgeon W. E. Home took part.

TREATMENT OF LATE NEURO-SYPHILIS AND DISSEMINATED SCLEROSIS.

A meeting of the Liverpool Medical Institution was held on October 25th, with the President, Dr. J. Hill Abram, in the chair, when Dr. A. C. Ransome read a paper on the treatment of late neuro-syphilis and disseminated sclerosis.

Dr. Ransome gave the results of his treatment of those two classes of organic nervous diseases in Manor Hill Neurological Hospital. Cases of tabes, tabo-paresis, and early general paralysis of the insane were divided into two groups for treatment according to the condition of the cerebro-spinal fluid. Those with a high cell count, a tabo-paretic gold curve, an excess of globulin, and a positive Wassermann reaction were given intrathecal injection of reinforced salvarsanized serum, while those with a luetic gold curve, a lower cell count and globulin excess, and a positive Wassermann reaction were given neo-kharsivan or mercury oxycyanide by intravenous injection. Both groups received the same after-treatment of mercury and potassium iodide by the mouth. The clinical results of treatment agreed very closely with the effects on the condition of the cerebro-spinal fluid. In this the reduction of lymphocytes and of globulin and the flattening out of the gold curve were very marked, and were accompanied by the cessation of pains and crises, by increased control of sphincters, and in some cases by ability to return to work. Lantern slides were shown illustrating the condition of cases before treatment, after treatment, and after an interval of a year.

The reports of thirteen cases treated by intrathecal salvarsanized serum showed that 8 had improved, in 3 there was no change, one was worse, and one case was transferred. Twenty-six cases treated by intravenous neo-kharsivan and mercury oxycyanide showed 9 improved, in 11 no change, and 6 left hospital. Thus intrathecal treatment appeared to be more efficacious than intravenous, in spite of the fact that the former group were more advanced clinically and pathologically. Thirty-six cases of disseminated sclerosis were treated by intravenous injection of silver salvarsan on the assumption that the disease was caused by a specific spirochaete distinct from that causing syphilis. The results were: 14 improved, in 10 no change (including 5 only recently treated), 9 left hospital, and 3 died of intercurrent disease. While allowing for errors of observation, possible remissions, for the concomitant effects of massage, exercises, healthy surroundings, etc., Dr. Ransome considered that the result of this treatment was encouraging and worthy of further trial.

Dr. Douglas Bigland thought that too much weight had been placed upon the colloid gold reaction, which was notoriously unreliable on occasions. This test was most useful when it agreed exactly with the other spinal fluid reactions. While agreeing that good results might be obtained from intrathecal therapy, yet he had obtained just as good effects with drugs administered by the intravenous and oral routes. He considered that when two methods of treatment gave approximately equal results the simpler, the less expensive, the less painful, and the more generally applicable one should be used in preference to the one which had not those advantages. In his opinion the effects of mercury, especially when administered by inunction, were little short of marvellous in certain forms of neuro-syphilis.

Dr. Baker Young said that the advocates of intrathecal therapy claimed that advanced cases of neuro-syphilis could be benefited and in some cases enabled to return to work, while in others the improvement would allow them to resume home life. Cases in which a paretic curve with the gold sol was persistent, in spite of treatment, were invariably fatal and particularly prone to suicide. Intrathecal therapy was indicated in early cases which showed an abnormal fluid. Fordyce said that at least 25 per cent. showed changes even after intensive treatment intravenously. If those cases were then treated intrathecally the fluid became normal and the natural inference was that a potential tabetic or paretic finale had been avoided.

Dextrocardia.

Dr. John Hay and Dr. H. Wallace Jones read a note on dextrocardia. Dr. Wallace Jones said that the term "dextrocardia" in its widest sense was applied to a heart beating in a more or less permanent manner in the right half of the thorax. The condition had been known from ancient times, but the modern application of the x rays and electro-cardiograph had made the diagnosis one of comparative ease. He classified the varieties as follows:

1. Inversions ("mirror image" of the heart). (*a*) Complete. (*b*) Incomplete: (1) Transposition of viscera with heart in the normal position. (2) Complete inversion of the thoracic organs, and the liver situated in the middle line. (3) Inversion of the heart only.
2. Dextro-versions (heart displaced to the right without inversion of the cavities). (*a*) Occurring during foetal life. (*b*) Acquired since birth.

He showed records of four cases, two cases of complete transposition with inversion of the main deflections in lead I of the electro-cardiograph, and two cases of acquired dextrocardia not due to any obvious cause, with normal electrocardiograph records.

Syringomyelia.

Dr. T. W. Wadsworth read a note on a case of syringomyelia—a patient who died, aged 51, from a pontine haemorrhage. On *post-mortem* examination there was an extensive

gliosis of the central region of the cord extending from the upper cervical cord to the lumbar region. In the cervical and mid-dorsal regions there were large cavities near the central canal, not lined by ependyma. The patient had manifested symptoms of syringomyelia for over twenty years, and carried on his occupation as a labourer up to three years of the time of his death. His hands were claw-like, with many scars, due to old painless injuries and burns, some of the latter being recent; tactile sensation was almost normal, but there was loss of sensation to heat, cold, and pain, especially of the hand. There was well marked scoliosis and spasticity of the legs; towards the end he became ataxic. No arthropathy, perforating ulcer, nor nystagmus was present.

DISSEMINATED SCLEROSIS.

The Royal Medico-Chirurgical Society of Glasgow met on October 19th, with the President, Dr. Maitland Ramsay, in the chair, when a discussion was held on the pathology, symptomatology, and treatment of disseminated sclerosis.

Dr. Douglas Adams in an opening paper briefly reviewed the literature of disseminated sclerosis, and referred more particularly to recent results obtained in an investigation which was being carried out in the Pathological Department of the University and Western Infirmary of Glasgow in collaboration with Drs. E. M. Dunlop, J. W. S. Blacklock, and J. A. W. McCluskie. In a considerable number of cases paralysis had been transmitted to rabbits by the injection of blood or spinal fluid from patients suffering from the disease, and had been passed from rabbit to rabbit, both by direct inoculation and by passage through culture. Spirochaetes were found in the organs of seven of the inoculated animals both by dark ground examination and by staining, though examination of the cultures employed yielded negative results. These results were regarded as confirming the view that the disease was infective in origin. Emphasis was laid on the necessity for early diagnosis, and in this connexion the value of the colloidal gold reaction was urged. The results of intensive antispecific treatment of fifty cases were referred to. In many cases considerable clinical improvement had been noted and this had coincided with a modification of the colloidal gold curve in a negative direction. In the majority of cases the subsequent absolute or relative freedom from relapses during a period of three years was striking. The investigation was being continued under a grant from the Medical Research Council.

Dr. J. W. S. Blacklock described in more detail the various experiments performed, and said that when blood or spinal fluid from cases of disseminated sclerosis had been inoculated directly into rabbits about one-third of the animals developed nervous symptoms. Emulsion of the central nervous system of these paralysed animals produced nervous symptoms in a proportion of cases on inoculation into other animals either directly or after passage through Noguchi's medium. No nervous symptoms had been noted in over 200 normal control animals kept under observation for periods varying from four months to over a year, nor had paralyses developed in animals inoculated with various protein substances. He considered it probable that a virus was present in the blood and cerebro-spinal fluid of these patients which was capable of existing in the central nervous system and of producing paralysis in a proportion of the animals inoculated. The pathological lesions that had been noted in the central nervous system of the inoculated animals were: (1) Cellular infiltration, chiefly under the ependyma of the ventricles. (2) Degeneration of nerve tracts—this had been observed only in one animal which had lived for over a year after the onset of paralysis; the other animals which had shown nervous symptoms had lived for too short a time after the onset of such symptoms to allow definite pathological changes to occur. (3) Petechial haemorrhages. (4) Multiple lesions of the nature of softening.

Dr. Brownlow Riddell referred to the frequent occurrence of slight and transient eye symptoms in the early stages of the disease, and urged the importance of a critical interpretation of such symptoms in a case presenting no other apparent clinical feature. The surprisingly slight attention paid by the average patient to transient eye symptoms, with the speedy recovery therefrom, and the absence of any other sign or symptom, combined to present a clinical picture often underestimated or attributed to a functional, hysterical, or digestive origin. Dr. Riddell then discussed in detail the various symptoms, including diplopia, acute retrobulbar neuritis, nystagmus, and optic atrophy, and described a number of illustrative cases.

Professor C. H. Browning, in commenting on the results of the experimental work, said that the small proportion of successful transmissions was not surprising in view of the insusceptibility of both man and animals to the disease. He emphasized the fact that the virus persisted in the culture media which had been inoculated with blood from cases and kept over long periods in the incubator, and was inclined to the opinion that the pathogenic agent was a living organism or the product thereof. He then referred to the value of the colloidal gold reaction as a means of early diagnosis and of controlling the results of treatment.

Professor Robert Muir, in referring to the pathological and histological changes in the disease, said that while they were very definite they yet presented certain peculiar characteristics. The essential features at an early stage were (*a*) a disappearance of the myelin sheaths, (*b*) a persistence of the axis cylinders, and (*c*) an absence of Wallerian degeneration. These changes occurred in patches which were often sharply cut off, as though by a knife, from the surrounding healthy tissues. The process was peculiar and quite unlike a true sclerosis. The colloidal gold reaction in the cerebro-spinal fluid he considered would mark a real advance, if completely established, and would prove of great assistance in controlling treatment. Referring to the etiology, he was of the opinion that, while a great many facts supported the infective theory, the state of the experimental work was as yet too uncertain for complete proof. While hopeful, it was not conclusive.

The annual meeting of the West Kent Medico-Chirurgical Society was held on October 12th at the Miller General Hospital, Greenwich, when Dr. W. H. Payne, the retiring president, vacated the chair to Dr. E. G. Annis, M.O.H. for Greenwich. Mr. C. A. Joll showed two specimens of carcinoma of the rectum: (1) from a woman aged 65, who suffered from mucous stools, tenesmus, and haemorrhage, and (2) from a man, aged 64, who suffered from pain and diarrhoea; he also reported a case of fibro-sarcoma of the thigh muscle, without any glandular involvement, the tumour being an encapsulated cyst. Dr. H. Pritchard showed a young woman, aged 24, who developed a streptococcal empyema fourteen days after childbirth; an abscess developed in the left buttock; the lung was not involved. He pointed out the rarity of a primary streptococcal pleurisy. The case was treated by opening, drainage, and antistreptococcal serum. Dr. M. Davidson showed a case of pernicious anaemia, with blood and nerve lesions. Injections of iron cacodylate were given, and also arsenic by the mouth.

A meeting of the Bath Clinical Society was held at the Royal United Hospital on October 5th, with Dr. W. P. Kennedy, President, in the chair, when Dr. R. G. Gordon read a paper on the "Difficult Child." He dealt with the types of difficult behaviour in children both in infancy and in later life. The importance of the attitude of the parent was emphasized. The causes of failure of integration of the personality leading to difficulty in adaptation to life were classified under three headings in relation to the proper functioning of the cortex: (1) Failure of development—mental deficiency; (2) disease of the cortex, especially congenital syphilis and epidemic encephalitis; (3) inherent lack of proportion in dispositions leading to psychological maladaptations. Illustrative cases were described. Dr. R. Waterhouse showed a case of anterior poliomyelitis with a meningitic origin. Mr. A. L. Fuller showed a case of webbed fingers treated by a graft from the thigh. Mr. J. S. Levis showed three specimens—one of hydronephrosis due to a calculus blocking the ureter, the second a heart showing four active valves, and the third an epithelioma of the liver. Mr. A. L. Fuller showed a specimen of a gall bladder, shrivelled and partly calcareous, the size of a pea, and a gall stone the size of a walnut, removed from the common duct in the same patient.

Reviews.

THE MEDICAL HISTORY OF THE WAR: PATHOLOGY.

The latest of the series of volumes of the official medical history of the great war, that dealing with *Pathology*,[1] has a historical as well as a scientific interest. In the later years of the war a most efficient service was evolved whereby physicians and surgeons were able to call in the aid of skilled pathologists and bacteriologists, whether working in the well-established base hospitals or under the more primitive conditions existing at casualty clearing stations or field ambulances. At each halting place of the sick or wounded soldier expert pathological assistance was available, and, though the patient passed on from one unit to another, he carried with him documents recording the investigations carried out in the laboratories of the hospitals through which he had passed, and he often arrived at his destination accompanied by reports describing intricate chemical, histological, and bacteriological examinations performed in the forward units. It is interesting to learn from what humble origin this elaborate organization was evolved. Sir William Leishman tells us in the first chapter of this volume that prior to 1914 no central pathological organization existed in the army, nor had one been contemplated in war establishments. In spite of the comparatively recent experience of the South African war no essential increase or change in the scale of establishment of pathologists had been introduced, and all that was laid down was that each general hospital of 1,040 beds should include in its equipment a well-appointed bacteriological laboratory, and that this should be placed in charge of one or of two officers detailed as bacteriologists. When war broke out the War Office limited itself to the provision of personnel and equipment, leaving it to the medical directorate to employ these to the best advantage. Appointments to the posts of bacteriologists of general hospitals on mobilization were made by the Director-General's staff from such regular specialists as were available, and afterwards from temporarily commissioned officers who had had experience in bacteriology.

The supply of the first group was very soon exhausted: of all the regular officers who had qualified as specialists in bacteriology before the war no more than four remained at this work by the time the campaign was six months old. Practically all the routine pathological work was done therefore by temporarily commissioned officers. The grave problems raised by the unexpected prevalence among the wounded of tetanus, gas gangrene, and the other forms of sepsis led, in October, 1914, to the appointment of Sir William Leishman as adviser to the Director-General of the medical services in all matters relating to pathology and the employment of serums and vaccines. This post he held with great distinction until April, 1918, when he was relieved by Colonel S. L. Cummins.

The need for delegation of part of the duties of supervising and co-ordinating the work of the laboratories became manifest towards the end of the war, and authority was given for the appointment of an assistant adviser in pathology to each army and to each of the principal bases. Under their supervision worked the medical officers in charge of mobile laboratories and the pathologists at base and general hospitals. The dimensions to which the service grew are made apparent by the facts that twenty-five mobile bacteriological laboratories were supplied to armies overseas, and that at the end of 1917 pathologists were attached to 75 of the 85 hospitals serving the British armies in France.

No provision had been contemplated in the war establishments for the installation of central laboratories, to be devoted to research problems, and freed from the burden of routine duties. Fortunately the elasticity or, as Sir William Leishman puts it, "the fortunate absence of rigidity" of the system allowed the situation to be met in different ways, and at No. 13 General Hospital, Colonel Sir Almroth Wright was able to establish by degrees what was essentially a research laboratory, devoted in the main to the study of the pathology and treatment of wounds. Research work in other subjects was organized by the formation of committees of inquiry, who enlisted the services of pathologists specially qualified in the particular lines of research required, and who held meetings from time to time to draw up programmes of research and make the necessary arrangements for their effective conduct. This brief outline of the organization of the pathological service, drawn from the full and interesting records in the first chapter of this book, illustrates the way in which the scientific side of the medical services developed from very simple beginnings to the complex system which worked so successfully in the later stages of the war.

The remainder, and greater portion of this volume, records the advances made in the pathology of wounds and diseases of the war. Sir Almroth Wright's brilliant researches on the mechanism of physiological protection against infection of wounds are concisely described in a chapter entitled "The Physiology of Wounds." The experience of the war taught us a great deal about antiseptics, and led to the employment of many new varieties, but experience also demonstrated the limitations of antiseptics, and led many to hold the opinion that the most effective agency to invoke in order to destroy septic micro-organisms is the physiological power of the blood. These simple truths might, perhaps, have been stated in simpler language, for most readers will have to consult a glossary of scientific terms in order to understand such a sentence as that which appears on page 57: "The proper conception of drainage is arrived at when it is regarded as a kataphylactic operation whose object is to abolish ecphylactic conditions, and bring the phylactic powers of the blood into action upon the infecting microbes." It is true that these expressions are explained elsewhere in the chapter.

In a chapter on "Tetanus in its Statistical Aspects" it is pointed out that the mortality from this disease fell from 63.5 per cent. for 1914-15 to 37.9 in the 1916-19 period. Statistics of the incubation period show that symptoms manifested themselves in most cases between the sixth and eleventh days, but, on the other hand, there were some which developed as early as the second day after the wound, and others which did not develop until the forty-fifth day. The great importance of the early injection of antitetanic serum is emphasized by both figures and charts. The mortality rate in France in 1916, 1917, and 1918, in protected cases, was 66.5, as against 83.5 unprotected, and in England 22.5 as against 53.3.

Remarkable figures are contained also in the chapter on the enteric fevers. At the beginning of the war soldiers were only inoculated against the typhoid bacillus, but later on a mixed vaccine against both typhoid and paratyphoid fever was introduced with excellent results. A chart of the incidence of these fevers shows that the typhoid rate fell from 80 per 10,000 in December, 1914, to *nil*, and the paratyphoid from about 36 per 10,000 in January, 1915, to practically *nil*.

Much was learnt about the pathology of dysentery, both amoebic and bacillary, during the war. In regard to the former type, the new knowledge acquired of the habits of *Entamoeba histolytica* led to relaxation of many of the stern methods of isolation of individuals found to be harbouring this parasite, for it was shown that pathogenic amoebae are often found in the faeces of people who have never left this country, and that in the vast majority of cases infected people merely became healthy carriers of the organism. Obviously, therefore, there is no advantage to be gained by the isolation of carriers of amoebae; they can be set free in a community without grave risk of infecting others. The commoner form of dysentery in the war was the bacillary, and the chapter dealing with this

[1] *History of the Great War, Based on Official Documents. Medical Services: Pathology.* Edited by Major-General Sir W. G. Macpherson, K.C.M.G., C.B., LL.D., Major-General Sir W. G. Leishman, K.C.M.G., C.B., F.R.S., LL.D., and Colonel S. L. Cummins, C.B., C.M.G., LL.D. London: H.M. Stationery Office. 1923. (Demy 8vo, pp. 600; illustrated. £1 1s. net, post free £1 1s 9d.)

disease will be of great value to those who wish to obtain an outline of the present state of knowledge with regard to the different bacilli capable of causing dysentery, the most reliable methods of laboratory diagnosis, the treatment of dysentery carriers, and the mode of spread of the disease.

We have a discussion occupying twenty-three chapters of the pathology of many different diseases, such as typhus, cerebro-spinal fever, influenza, trench fever, spirochaetal jaundice, acute infective polyneuritis, gingivitis and Vincent's angina, war nephritis and encephalitis. It would occupy too much space to comment on all these, but the interesting and well written chapter on tuberculosis deserves special mention. The tuberculosis mortality rate was higher among men of the Labour Corps of the various countries than those of other units, and the surprising fact may be deduced from the statistics that the incidence of the disease was lower amongst the more urbanized and highest amongst the more isolated and scattered peoples. In the Portuguese troops, coming from a country where industrialism is less developed than in England, both incidence and mortality were much higher than amongst the British. In the Chinese labour units the number both of cases and of deaths was greater than amongst the Portuguese, though less than amongst the East Indians.

The war is blamed for having interfered with many scientific activities, for having discouraged scientists in the prosecution of their researches, and for having retarded the evolution of scientific knowledge. Many of the subsidiary sciences of medicine were not so affected by this gigantic upheaval, but advanced with increased acceleration to assist in solving the urgent problems the war brought in its train. In particular, pathology and bacteriology undoubtedly benefited greatly by the experience of the war, and the practical application of the advances in knowledge made by workers in these kindred sciences played a most honourable part in the successful prosecution of the war, as all readers of this volume of the medical history of the war will agree.

RADIOLOGY OF THE ABDOMEN IN CHILDREN.

THE third volume of the Annals of Roentgenology, entitled *Digestive Disturbances of Infants and Children Roentgenologically Considered*,[2] is the work of Drs. KERLEY and LE WALD in collaboration. The fact that the former is a consulting physician to a hospital for infants, whilst the latter is Professor of Roentgenology at the New York University, adds considerably to the value of the work from the diagnostic standpoint, and ensures a comprehensive view being taken both of the individual diseases and of their *x*-ray demonstration.

The book commences with a short note on the surgery of infants by Dr. William A. Downes, and following this is divided into two main portions. The first of these, the text, consists of about eighty pages profusely illustrated with photographs of pathological specimens, and, to show technique, with radiographs, and with drawings of operative findings. In this part descriptions of the various diseases illustrated occupy the main portion of the text and references are made throughout to the second part of the book, which is an *x*-ray atlas. Although dealing entirely with conditions in infants, no attempt has been made to draw too sharp a line, and many radiographs of adults have been used to emphasize some of the points discussed.

There is an interesting chapter on technique which, by means of illustrations, shows the methods of administering opaque food to infants who cannot be persuaded to take food in the normal manner. Then, following a short chapter on the oesophagus, the stomach itself is dealt with fully: congenital pyloric stenosis, pylorospasm, chronic dilatation without spasm or pyloric stenosis, ptosis, and syphilis, are all discussed. The concluding portion is devoted to the various conditions of the bowel found in infants, including the swallowing of foreign bodies. The chapters on non-rotation of the colon and hernia of the diaphragm are particularly useful.

The atlas contains fifty-four excellent plates which illustrate radiographically all the conditions met with; facing each plate is a description of the case, of the *x*-ray examination, of the operative findings, and a short comment on the whole. This is printed in English, French, and Spanish, and a liberal use has been made of lettering and arrows to assist study of the radiographs.

This book is one of a series of monograph atlases which is being issued under the editorship of Dr. James T. Case; they are intended to supply a kind of post-graduate course in special subjects, and to form reference books which should be of value to radiologists as well as other medical practitioners. It is a pleasure to handle and read such a book as this; the text is in very legible type, printed on thick glazed paper with good spacing and margins, and the numerous illustrations are of the highest quality and magnificently reproduced; the general arrangements leave nothing to be desired. No radiologist at any rate can afford to be without it.

[2] *Digestive Disturbances of Infants and Children Roentgenologically Considered.* By Charles G. Kerley, M.D., and L. T. Le Wald, M.D. New York: Paul B. Hoeber. 1923. (8 × 10½, pp. xxiii + 81; 54 plates, 166 figures. 2 dollars.)

THE LIFE-HISTORY OF THE BED-BUG.

IN 1892 the late Mr. Edward Saunders published his *Hemiptera-Heteroptera of the British Islands*, in which he gave keys for the identification of the species of British bugs, and good descriptions of the adults. But he made little or no attempt to deal with the larval stages or the life-histories of these insects. Mr. E. A. BUTLER, in the preface to his new book, *Biology of the British Hemiptera-Heteroptera*,[3] tells us that it is intended to supplement, and not to supplant, that of Saunders. His aim has been "to gather together into one book all the information that has been amassed by various observers, whether in the British Isles, on the Continent, or in America, about the early stages, the life-history and the habitats, habits and distribution of our British species." In all these respects Mr. Butler has succeeded admirably, and British entomologists are under a great debt of gratitude to him for placing at their disposal so much interesting and valuable information about a suborder of insects which has been decidedly neglected hitherto.

About 470 species of heteroptera have been recorded in the British Islands, but, although many of these are of much economic importance, medical interest in this country is confined almost solely to the bed-bug, and other British species of the genus *Cimex*. Of the ova, larval stages, life-cycles, and habits of these, Mr. Butler gives a very full account. Although the bed-bug has not yet been definitely proved to transmit disease to man, it must be regarded as a potential danger, since it is known that various pathogenic bacteria and the protozoan parasite of kala-azar can live in the gut of this insect. Further, the bed-bug demands attention on account of the singular modes of coitus and fertilization which occur in it. It is regrettable that Mr. Butler has only referred so briefly to the work of Berlese, and not at all to that of Major F. W. Cragg on this subject. Even if Berlese's theory of "hypergamesis" is untenable, the observed facts as to the fate of the large excess of spermatozoa received by the female bug in successive acts of coitus are of great biological and physiological interest. As Major Cragg's paper (*Ind. Journ. of Med. Research*, vol. viii, 1920-21) is not included in Mr. Butler's bibliography, it is possible that he has overlooked it.

Medical practitioners whose work lies in the tropics will desire to have some acquaintance with other families of bugs than the *Cimicidae*. Several species of Reduviids and Aradids bite man, and, in the case of the former family, are transmitters of forms of trypanosomiasis. Although, naturally, these exotic forms are not referred to in a book on British Heteroptera, Mr. Butler gives so much informa-

[3] *A Biology of the British Hemiptera-Heteroptera.* By Edward A. Butler, B.A., B.Sc., F.E.S. London: H. F. and J. Witherby. 1923. (Sup. roy. 8vo, pp. viii + 682; 7 plates, many figures. £3 3s. net.)

tion about the families to which they belong that a perusal of his book will be decidedly helpful to workers in the tropics. A list is given of the British Heteroptera, but there are, unfortunately, no keys for their identification. It is true that the author disclaims any intention of supplanting the work of Mr. Saunders, but, considering the high price of Mr. Butler's volume, it seems rather unreasonable to expect the student to purchase another equally expensive and rather scarce volume, in order that he may find out the names of his captures.

Mr. Butler's handsome book is very well printed and produced. It represents an excellent example of the best form of natural history book, written by an accomplished entomologist, who has studied the living insect, and is not merely content to make a collection.

RECONSTRUCTIVE SURGERY OF THE UPPER LIMB.

DR. STEINDLER'S book on *Reconstructive Surgery of the Upper Extremity*[4] is one of a series of surgical monographs published under the editorial supervision of Drs. Lewis, Pool, and Elting. We understand that the five monographs on very diverse subjects are only sold in sets. This rule must surely be discouraging to the surgeon who seeks information on only one of the subjects and does not want the other four books.

In his preface the author says that it is written as a record of personal experience rather than as a textbook. Bearing this in mind, we are prepared to find gaps in the subject-matter of the book where the author's personal experience has not covered the whole of the subject. With these limitations the book may be taken as a valuable and practical guide.

The first chapter is on subacromial bursitis. This disorder does not bulk nearly so largely in orthopaedic literature in England as recently in the United States. The author gives statistics of twenty-one cases of which only eleven were treated, two of them by operation. Five were cured. Fixation in splints or plaster is recommended for acute cases, open operation is regarded as necessary in resistant cases and physiotherapeutics in all. The author's attitude to birth palsy is judicious. The etiology of the condition is various and often obscure. Sever's operation of open tenotomy to correct deformity is said to give better results than operations on the brachial plexus, for which the indications are by no means clear at an early age, when only nerve suture is likely to succeed. Four cases of congenital elevation of the shoulder are recorded. In all the deformity was far more complicated than the title implies, and all were treated by massage and manipulation and gymnastic exercises without operation.

As was to be expected, Dr. Steindler has had considerable experience of the deformities following anterior poliomyelitis. In flail elbow, shoulder, and wrist he has had good results from arthrodesis in the positions of choice. In spastic paralysis Stoffel's operation has given some good results, but arthrodesis of the wrist and plastic operations for flexion contracture of the thumb are preferred. Training, of course, plays a large part in after-treatment. For tuberculosis of the elbow resection in adults and conservative treatment in children gave the best results. The same principles are applied to other joints of this extremity. The chapter on congenital malformations and deformities is full of interest, for the author appears to have had a rich experience, but it is not possible to summarize it in this notice. Traumatic deformities are also well described and discussed and some interesting peculiarities are recorded. There is a useful bibliography to each section of the work and many photographs, some of which, however, are not very instructive, but the diagrams of operative procedures are clear.

[4] *Reconstructive Surgery of the Upper Extremity.* By Arthur Steindler, M.D., F.A.C.S., Professor of Orthopaedic Surgery, Iowa State University Medical School. Surgical Monographs, under the editorial supervision of Dean Lewis, A.B., M.D., Eugene H. Pool, A.B., M.D., and Arthur W. Elting, A.B., M.D. New York and London: D. Appleton and Company. (Sup. roy. 8vo, pp. xix + 310; 50 plates. £6 5s. the set. Issued as sets only.)

NOTES ON BOOKS.

THE new number of *Brain*[5] contains an account by Dr. Douglas McAlpine of the histological examination, conducted in the pathological laboratory of the National Hospital for the Paralysed and Epileptic, Queen Square, of two cases of the Parkinsonian syndrome following encephalitis lethargica. The most constant lesions were subacute inflammatory changes and recent perivascular haemorrhages. In one case the substantia nigra showed marked degenerative changes, and the observations are discussed in the light of fourteen such cases reported in the literature. In six cases of encephalitis lethargica calcification in the anterior part of the globus pallidus was found, in one instance as early as the fourth day of the disease. This paper is illustrated by a coloured plate. Another paper in this issue is by Dr. F. M. R. Walshe, neurologist to the medical unit of University College Hospital, who deals with variations in the form of certain reflex movements. Papers on cerebellar localization by Dr. Sven Ingvar of Lund (Sweden), and on lesions of the central nervous system in osteitis deformans by Dr. W. G. Wyllie, and a few notes from recent publications, complete the number.

The thirty-second edition of the Charity Organization Society's *Annual Charities Register and Digest*[6] has appeared. This useful reference book supplies a classified dictionary of charities of all kinds in London or available for the population of London. The charities are divided into those that give relief in affliction (for the blind, deaf and dumb, insane, epileptics, incurables, etc.), relief in sickness (general and special hospitals, medical and surgical homes, and surgical aid societies), relief in distress—(1) permanent (homes for the aged and incapacitated, pensions, homes for youths and children, and educational institutions), and (2) temporary (shelters, and institutions giving relief in money and in kind); reformatory relief (including prisoners' aid societies), miscellaneous charities, including, for instance, training farms for the unemployed, and charities for the protection of the helpless; and, lastly, spiritual institutions. Excluding missionary and religious institutions, which had an income of £3,768,814, the gross income of the institutions enumerated in the *Register* for the year 1921 was £13,654,466. This large sum, however, hardly gives a correct view of the true income of the metropolitan charitable institutions; the voluntary contributions included in this amount to £5,716,943, which sum rather represents income in the sense in which it is colloquially applied. The volume is carefully compiled and well indexed, and gives useful information which cannot easily be found elsewhere.

In view of the opportunity afforded by the war of carrying out on a vast scale both new and old forms of treatment and technique, and in view of the results obtained, Dr. E. M. FOOTE has revised his *Textbook of Minor Surgery*.[7] He has, for example, given accounts of the Carrel-Dakin treatment and of the treatment of burns by paraffin wax, though the author has done well not to introduce hurried chapters on war wounds, as have the authors of many other books. We would have expected more to have been said on the subject of shock, and that the indirect methods of blood transfusion might have been mentioned. The regional method of dealing with the minor ailments of the body naturally leads to a good deal of repetition, and the book will on this account perhaps be of the more service to the casualty officer, the house-surgeon, and the general practitioner, who are concerned with the prompt treatment of such lesions. For the student who is up for examinations the book cannot be so strongly recommended, as the information is too scattered. and he would be better advised to adhere to his own textbooks, in which the classifications are according to systems. In some places the context assumes a certain amount of surgical knowledge—for instance, Nélaton's line is mentioned, although it is not explained, and signs, symptoms, and pathology are not arranged concisely enough to favour ready retention, or in a manner likely to meet the train of thought of the examinee. However, the student might do well to read up the chapter on bandaging, which is better described and illustrated than in most of our own textbooks. It is surprising to find that such old friends as Perthes's, Schlatter's, and Kohler's disease have not crept into this edition. To those involved in the daily practice of minor surgery this volume still remains a good source of reference and a helpful guide in the matter of practical detail.

[5] Vol. xlvi, part iii. London: Macmillan and Co. (6s. net.)

[6] *The Annual Charities Register and Digest.* Thirty-second edition. London: Longmans, Green and Co., and Charity Organization Society. 1923. (Demy 8vo. pp. xx + 533. 7s. 6d. net.)

[7] *A Textbook of Minor Surgery.* By Edward Milton Foote, A.M., M.D. Fifth edition. New York and London: D. Appleton and Co. 1923. (Med. 8vo, pp. xxxi+845; 440 figures. 35s. net.)

In *How our Bodies are Made*[8] Dr. R. M. WILSON talks in simple conversational language to very young people; the copious illustrations in the text have some attractive original features; thus an illustration of a healing wound represents the leucocytes as "white submarines mending a cut in the thumb by turning themselves into bricks," and the gastro-intestinal tract and its contents are shown as a continuous lake and rivers with tiny ships floating down on the stream. Many medical men will probably think this little volume suitable for their future successors.

The *Pocket Cyclopaedia of Nursing*,[9] edited by Dr. R. J. E. SCOTT, is a useful little reference book for nurses. The subjects with which it deals are arranged in alphabetical order with headings in heavy print at the top of each page in order to simplify reference. This collection of useful information which might be required by a nurse comprises such varied subjects as the technique of an intestinal anastomosis, the removal of stains from linen, Atwater's caloric requirements, the Binet-Simon tests, and the Schick test. The information on each subject is clear and concise, and should prove of great help to the intelligent nurse.

[8] *How our Bodies are Made.* By R. McNair Wilson, M.B., Ch.B. Oxford Medical Publications. London: Henry Frowde, and Hodder and Stoughton. 1923. (Cr. 8vo, pp. viii+246; 118 figures. 5s. net.)

[9] *Pocket Cyclopaedia of Nursing.* Edited by R. J. E. Scott, M.A., B.C.L., M.D.New York. New York: The Macmillan Company. 1923. (3½" × 6¾", pp. 746; 40 figures. 14s. net.)

MEDICINAL AND DIETETIC PREPARATIONS.

TWO NEW DRUGS.

MR. W. H. MARTINDALE, Ph.D., has recently put on the market two interesting new drugs, aspriodine and sedasprin.

Aspriodine.

The formula of aspriodine is $C_6H_3I.O.CH_2CO.COOH$, and it contains 41.47 per cent. iodine and 58.53 per cent. aspirin. It is an insoluble, practically tasteless white powder which is not affected by weak acids, but which is readily split by weak alkalis into iodine and aspirin. In consequence of these properties it is not dissolved in the stomach and does not produce gastric irritation, but is broken up in the intestine. Iodine appears in the urine within a short time of taking a dose. Aspriodine therefore combines the therapeutic properties of aspirin and iodine in a stable definite chemical compound. The dose is about 5 grains three times a day after food, but this dose may be increased if desired.

Sedasprin.

Sedasprin ($C_6H_3Br.O.CH_2CO.COOH$) contains 30.86 per cent. bromine and 69.14 per cent. aspirin. Like aspriodine, it is an insoluble white powder, stable at ordinary temperatures, insoluble in weak acids but rapidly dissolved and split by weak alkalis. The process of its absorption is similar to that of aspriodine. The compound has the combined properties of bromides and aspirin, and therefore should be useful in a wide range of clinical conditions in which it is desired to give a mild sedative and analgesic. The dosage indicated is from 5 to 10 grains three times a day.

Both drugs can be obtained from the firm of W. Martindale, 10, New Cavendish Street, London, W. The price of both is the same, as follows: Tablets (5 grains), 25, 2s. 6d.; 100, 7s. 6d. Cachets (5 grains), 24, 3s.

THE SEMON LECTURE.

THE Semon lecture of the University of London was delivered in the Hall of the Royal Society of Medicine on November 1st by Dr. A. LOGAN TURNER, who took as his subject "The advancement of laryngology and otology: a plea for adequate training and closer co-operative action."

After briefly reviewing the position of laryngology in this country in Semon's early days in London in the late seventies, the lecturer proceeded to the main subject of his address, which dealt with a consideration of the teaching of the specialty. The occasion seemed to be very appropriate for its deliberation, as the period was one in which educational changes had been effected and the teaching of laryngology and otology had become a compulsory subject in the medical curriculum. The subject was discussed under three heads: first, the education of the student of medicine; secondly, the education of the young specialist; and thirdly, the education of the teacher. The three were intimately linked together.

Under the first head, Dr. Logan Turner dwelt upon the advantage to the medical student of obtaining some theoretical and practical knowledge of the commoner diseases of the throat and ear, and the method of dealing with their primary treatment; of recognizing the symptoms which indicated the spread of local infection and the dangers arising therefrom; and the importance of estimating the significance to be attached to symptoms and signs indicative of the existence of systemic disease or a central nerve affection. The preventive treatment of disease in the throat and ear should also be duly emphasized.

The education of the young specialist was a problem of some difficulty, and the question was undoubtedly an economic one for some, and its financial aspects could not be altogether ignored. In every case the course of special training should be preceded by a period devoted to the study of general medicine and surgery obtained by means of a house-physicianship and house-surgeoncy in a general hospital, while some experience in general practice would be of value. The period of special training, which might reasonably cover three years, should include not only clinical experience in a special department, but should comprise laboratory training in pathology and bacteriology; the study of the gross and minute anatomy of the brain in its relation to the specialty, the cranial nerves and their central connexions; the physiology and physics of olfaction, audition, and equilibration; and some knowledge of phonetics. This instruction should be carried out under the control and guidance of qualified teachers in the subjects, who would be prepared to provide the necessary certificates. Clinical experience in an eye department and in the wards of a physician specially conversant with nervous diseases would form a useful part of the training. Six months would be well spent abroad in centres where anatomical material for dissection and operative courses were more easily obtained, and where opportunities for endoscopic work on dogs and the human subject were available. If diplomas were to be conferred, the regulations governing them should exact certificates showing evidence both of clinical and scientific training along these lines. At this point the lecturer dealt with certain suggestions bearing upon the question of diplomas and the Fellowship examinations.

The education of the teacher involved the problem of the better organization and equipment of the ear and throat departments, and increased facilities both for clinical and laboratory research. The lecturer referred to the advantages which the pupil derived from coming in contact with the teacher who was also an investigator educating himself through his own researches. Research work would become facilitated if the work of the staff of the department was co-ordinated and more equally subdivided, so that each member had more time and leisure, and thus retain more energy to pursue the work of investigation. If the junior members were encouraged and properly directed more could be accomplished than had hitherto been done. As the result of such co-ordination it might be possible to establish some co-operative action between the various throat and ear departments in the country, and clinical research along the lines of collective investigation would yield information of real scientific value. A closer working alliance between these departments and other departments of the hospital, and between them and the workers in the laboratories, would lead to the advancement of the specialty in Britain. There were lines of research awaiting co-operation between the laryngologist and the otologist, on the one hand, and the physiologist, the biochemist, and the pathologist, on the other. Veterinary science and the large field of inquiry embraced under the term of comparative anatomy offered great scope for fresh lines of co-operative effort. To maintain an attitude of complacency combined with a sense of complete satisfaction towards things as they exist would inevitably lead to a halt in the onward march of progress. In education there was no finality.

British Medical Journal.

SATURDAY, NOVEMBER 10TH, 1923.

THE INSURANCE CRISIS.

THE executive bodies of Approved Societies have sent to the Minister of Health a long "statement of the Societies' case against the proposal to appropriate towards the remuneration of panel doctors for the present type of medical service sums contributed by the insured population and their employers for other benefits." This quotation from the preamble to the statement itself embodies an untruth, and the statement contains several assertions which can be similarly characterized, as well as a larger number of others which seem to be deliberate suggestions of what is false. It is unnecessary to traverse them all. The Societies' letter is too long and involved to be read by those who are not directly interested; those who wish to believe what it contains will no doubt do so in any circumstances; those who know the facts will detect the misstatements with relative ease. In general the statement shows not only a complete misapprehension of the work of the medical profession, and of the contentions of insurance practitioners in the present controversy, but also a failure to appreciate the very elements of what an insurance scheme implies—a matter the writers might be expected to have studied before setting out to instruct the Minister and the public. To take only two examples: the Societies contend that because drugs were not prescribed on the occasion of every attendance on a patient all the other attendances were not "essential" and therefore ought not to be "taken into account"; and that it is improper, if not illegal or immoral, for doctors to receive any insurance credits for insured persons who are not ill or who do not consult them when they are ill. It is strange that contentions so absurd should be put forward in a document evidently intended to be taken seriously.

The letter of the Societies makes abundantly clear how necessary it was to obtain from the Minister the declaration which is placed in the forefront of his new offer (printed in last week's SUPPLEMENT, p. 209); and how great will be the gain to the profession if it is put effectively into practice, as it must be assumed will happen if the profession accepts one or other of the Minister's alternatives. The Societies explicitly claim that additional benefits take priority of the full payment for medical attendance and treatment determined on its merits if this should be more than a certain sum. It may be pointed out that the Act of 1911 does allow additional benefits in certain circumstances to be substituted for sickness and disablement benefit, but in no circumstances does it allow medical benefit to be touched. The Societies describe the contention (accepted by the Minister) that medical attendance and treatment should first be provided for as an "astounding proposition." The framers of the Act evidently regarded it as axiomatic, and no doubt the public generally, as well as the insured persons, will agree. Societies would soon become aware of it if insured persons were allowed to claim sickness benefit apart from medical treatment.

Again, the Societies dispute the allegation that they desire to dominate the insurance practitioners or the insurance service. They merely "take an interest in the fees paid to doctors"—an interest so keen that they dispute the right of the Minister to negotiate with the profession for its services to the community without their intervention, or his right to offer one penny beyond what they are pleased to approve. If the medical profession did not combat this to the utmost, "interest" and "domination" would have to be accepted as synonymous terms. Let it be admitted at once that the Societies have an absolute right to be heard as to the "source whence the money is to be derived." They have a vital concern in the National Health Insurance Fund. This the profession has never disputed, but it carries with it no right to be a party to determining, on its merits, what insurance practitioners ought to be paid for their services. The Societies' letter concludes by expressing "their determination to resist to the utmost the unjust demand of the British Medical Association that the insured persons' funds should be raided." Neither the Association nor anyone else authorized by the profession has made any such demand. Nor has the Association ever contended, as the letter alleges, "that there are other National Health Insurance Funds from which money can be found." This, like other such statements, is a myth. The contention of the Insurance Acts Committee is that, on the merits of the case, there is no justification for reducing the present capitation fee; and its belief is that the present state of the Fund in the aggregate would allow this fee to be met from that source without danger to other interests. The Committee has been led to this belief by an investigation by its own experts; it has been confirmed therein by the fact that two of the signatories to the Societies' letter have themselves signed the following statement: "We have satisfied ourselves that the National Health Insurance Fund in the aggregate contains sufficient money to meet the cost without lowering or endangering the revision of the other benefits (whether normal or additional) to which insured persons are entitled," and by the further fact that an identical conclusion has been accepted, after investigation, by the Trades Union Congress General Council and the National Executive of the Labour Party.

These matters of insurance finance, of Approved Society administration, and of the granting of additional benefits will, amongst others, be the subject of inquiry by the Royal Commission which the Minister of Health has promised. We understand that attention was immediately drawn to the Prime Minister's statement at Swansea on October 30th, "that the Royal Commission would examine especially the question of medical benefit," and that no such limitation of the inquiry is in fact contemplated. It will, on the contrary, be the full inquiry that the Insurance Acts Committee has asked for. The Minister of Health has informed the Committee that a Royal Commission will be set up to investigate and report on the whole system established under the National Health Insurance Acts, including medical benefit and the remuneration of practitioners, and has promised that the terms of reference to this Commission will be agreed with the profession. In his speech at Manchester on November 2nd the Prime Minister indicated that the Government also proposed "to examine and co-ordinate and improve the existing schemes of insurance, and adjust those evils that

affect the life and health of the people, such as old age and ill-health and unemployment."

There is therefore great danger of confusion, and the Government will have to consider carefully the relationship between the two inquiries which appear to be contemplated. An almost unending vista of chaotic and overlapping material is presented to us in the Prime Minister's speech at Manchester, and it is difficult to see how all the subjects he enumerated can be combined without overloading even a Royal Commission and postponing any report to an indefinitely remote future. One thing is at any rate imperative. In view of a possible early general election the Royal Commission with the reference indicated by the Minister of Health, sufficiently wide yet clearly defined, must be set up at once, or the promise which is part of the Minister's offer will be in serious danger of never being kept. This would be fair neither to the Minister nor to the medical profession.

At its meeting on November 7th the Insurance Acts Committee resolved to advise the Conference of representatives of Local Medical and Panel Committees on Wednesday next, November 14th, to accept the Minister's offer, and decided by a majority to recommend acceptance of "alternative *b*"—the proposal to set up an immediate Court of Inquiry to determine the appropriate capitation fee for 1924.

LETHARGIC ENCEPHALITIS AND HERPES FEBRILIS.

THE researches carried out in recent years on the nature of the infective agent causing lethargic encephalitis have shown that the filtrable virus obtained from lesions in man, when introduced into susceptible animals, becomes localized in the central nervous system, travelling to it along the nerve trunks, but that the blood and internal organs, with the exception of the liver, do not contain it. Researches on herpes febrilis (or labialis) have shown that the vesicles contain a filtrable virus, infectious to the rabbit, and in a lesser degree to the guinea-pig and mouse. When the virus is scratched into the cornea a lesion is produced which can be transferred from rabbit to rabbit, but no visible micro-organisms have been found in the discharge from the conjunctival sac. Nevertheless the diluted filtered discharge, when inoculated into the brain of a rabbit, produces all the symptoms of lethargic encephalitis and leads invariably to the death of the animal. Consequently it is held that the virus of encephalitis lethargica and that of herpes febrilis are closely related if not identical.

There are other infections in man and animals related to herpes febrilis and encephalitis lethargica the causal agents of which are unknown. Thus certain clinical observations appear to indicate that epidemic chicken-pox may originate from a case of herpes febrilis, and certain experiments prove that the cornea of a rabbit may be infected by the contents of the chicken-pox vesicles. Levaditi thinks that the virus of mumps may be closely related to that of lethargic encephalitis, and certain infections of animals, including foot-and-mouth disease, are believed to belong to the same category. Szymanowski and Zylberlast-Zand,[1] working at Warsaw, have made a special study of the symptoms and pathological lesions in encephalitis herpetica and encephalitis lethargica. They obtained the material for the former experiments from a patient suffering from herpes and transferred it to the cornea of rabbits, all the experiments yielding positive results. The course of the disease was either acute or chronic, and inoculation of the same material subdurally caused cerebral changes manifested clinically by a series of nervous symptoms, such as unnatural positions of the head, stereotyped circus movements of the body, profuse salivation, stiffness of the jaw, and paresis. *Post-mortem* examination of the brain revealed pathological changes identical with those due to lethargic encephalitis. In studying lethargic encephalitis they employed as infective material cerebro-spinal fluid and discharge from the nasopharynx of patients suffering from lethargic encephalitis, and emulsions of the brains of patients dead of this disease. The infective material was introduced into the eye and under the dura mater of the brain or spinal cord; fifty-five inoculations gave eighteen positive results. They proceeded to inoculate healthy rabbits with brain emulsions of rabbits infected with lethargic encephalitis, but here met with difficulties, since a secondary infection destroyed a large number of the animals. They found it much more difficult to infect rabbits with material taken from other infected rabbits than with material from human cases. Still, in the positive cases the clinical symptoms of infection by lethargic encephalitis were identical with those of herpetic infection, though the local changes in the eyes were more intense in herpetic infections. The pathological changes are, they say, identical in both infections. In the acute form of the disease there was a well marked infiltration of the pia mater all over the brain; in some places the blood vessels showed perivascular infiltration, and in the brain tissue, principally in the region of the lenticular and caudate nuclei, there were foci of cellular infiltration, consisting of mononuclear elements (large mononuclears and lymphocytes). The mononuclear infiltration was a constant feature, even in the most acute cases that proved fatal in two days. In the chronic cases there was much less small cell infiltration than in the acute, but more proliferation of the connective tissue in the meninges, and polyblasts and plasma cells were found in the nervous tissues. The reason why animals infected with the virus of herpes or lethargic encephalitis so often develop circus movements and disturbances of static position has not received a satisfactory explanation. It may be that in animals the virus has a selective affinity for the vestibular nerve as it has for the oculo-motor nuclei in man, or there may be a special arrangement of the blood vessels or some peculiar biochemical properties of these nuclei.

In all the animals infected with either virus inflammatory changes were found in the liver, consisting of a mononuclear infiltration round the small bile ducts; the inflammatory cells often penetrated between the epithelial cells, which were occasionally much proliferated. The liver was congested, and the cells around the blood vessels were often destroyed. These authors believe that both the liver and brain are affected simultaneously.

There are many characters common to the infection of man and animals with these viruses; the infiltration consists of mononuclear cells in both, its localization in the basal ganglia is also similar, and degenerative changes in the cerebellum occur in man as well as in the rabbit. The meninges, however, react differently, since in man their affection plays an important part in the pathological picture. This, and also the involvement of the liver, are arguments against Levaditi's hypothesis of a special affinity for tissues of ectodermal origin.

[1] *Brain*, May, 1923, pp. 43-97.

THE SEMON LECTURE.

THE Semon Lecture of the University of London, delivered by Dr. Logan Turner of Edinburgh on November 1st, brought together a large audience, including many oto-laryngologists from the metropolis and beyond it. An abstract is published in this issue (p. 885), and the full text will, we understand, appear in the *Journal of Laryngology*. In the evening Sir StClair Thomson held a reception of the members of the two Sections of Otology and Laryngology of the Royal Society of Medicine, and, to meet them, he had extended invitations to the Presidents of the Royal Colleges and the Royal Society of Medicine, to the Vice-Chancellor of the University of London, and to others interested in the sister departments of practice. It was attended by many guests and a large contingent of provincial members, who remained on in London for the meeting of the Section of Laryngology the following day and the Section of Otology two days later. The meeting room of the Royal Society of Medicine was completely filled at these gatherings, and the extra-metropolitan members expressed warm appreciation of the arrangements made to enable them to attend three such interesting gatherings during one visit to London. The cultivation of the social side of the work of these two Sections also helps to explain their activity, and the existence of a most admirable *camaraderie*. The Central Throat Hospital held its annual dinner under the chairmanship of Dr. Dan McKenzie on one of the evenings mentioned, and the Presidents of the two Sections (Dr. Banks-Davis and Mr. Sydney Scott) entertained their councils, the Semon orator, and Professor Burger of Amsterdam. The latter is an honorary member of the Section of Laryngology, and well known here as permanent secretary of the International Congresses of Medicine. He largely helped in the success of the last, that held in London in 1913.

INCIDENCE AND CAUSE OF HERNIA.

SIR ARTHUR KEITH devoted the Banks Memorial Lecture, which he gave before the University of Liverpool last week (as noted elsewhere), to the subject of the origin and nature of hernial formation. The full text of the lecture will, we understand, be published in the *British Journal of Surgery*, and we will confine ourselves here to a short account of its general argument. The lecturer began by dealing with the incidence of hernia, and observed that a great deal had been learnt about it through the very large number of physical examinations of men made during the severe recruiting for the war. Such examinations revealed the fact that among males of 18 to 41 in the South of Scotland, 36 per 1,000 suffered from hernia. In various parts of England the ratio was 10 per 1,000, and in the neighbourhood of Manchester and Stockport it was 50. Taking males at all stages of life he thought it probable that about 20 per 1,000 would be found to be suffering from hernia, but that in females, excluding pelvic protrusions, the ratio was 3 to 4 per 1,000 only. He alluded to the work of Rushton Parker, who, after the introduction of Listerian methods, was a pioneer in performing the operation for radical cure. The two theories of the cause of hernia held by various surgeons were then discussed. The one school considered that developmental defect was the prime cause, and held that no rupture occurred unless there was a preformed sac into which the protrusion could take place. The other school, to which Banks belonged, maintained that the protrusions and simultaneous formation of peritoneal pockets or sacs might be formed either before or after birth. The cases with which the surgeon was confronted in adult life were protrusions into sacs formed at the same period that the hernia developed. Sir Arthur Keith then dealt in detail with the descent of the testicle into the scrotum, and compared it to a severe operation that in some cases left the muscular abdominal wall weak. That other mammals did not suffer to anything like the same extent as the human infant was due to the much more efficient muscular arrangement in them than in the baby's groin. He thought that the efficient working of the muscular guard of the breach in the groin depended on the state of the bowels and other conditions over which medical men could exercise control. Before attributing to imperfect evolution a baby's liability to hernia, it would be well to explore first the possible mistakes we might be making in our nursing and treatment of infants. In adult life sudden muscular effort unmasked a latent hernia. Unfortunately we had no facts to guide us in deciding how far special occupations, involving particular movements and abnormal positions of the body, might influence the production of latent hernia. Further and exact observations were urgently wanted to elucidate the causes and conditions of what might be termed vocational ruptures.

FUMIGATION BY HYDROGEN CYANIDE.

FUMIGATION by hydrogen cyanide for the destruction of rats and insects was discussed a short time ago (September 22nd, p. 527) in a review of an article by Colonel Glen Liston, I.M.S., and we then described some of the precautions which are of importance. The Ministry of Health has now issued a preliminary report on the subject,[1] with a prefatory note by Sir George Newman, who explains that the investigations described were commenced under the supervision of Dr. Richard J. Reece, the senior medical officer of the branch of the Ministry's Medical Department which is concerned with port sanitary administration, and that the inquiries were made by Dr. P. G. Stock, one of the Ministry's medical officers, in association with Dr. G. W. Monier-Williams, one of the Ministry's chemical experts, who during the war had been specially engaged in the anti-gas section of the British Army in France. Dr. Reece and Dr. Stock visited the United States to study the method of cyanide fumigation employed in the ports of that country, and Dr. Stock also made inquiries on the subject in Holland and other European countries. The present preliminary report has been prepared by Drs. Stock and Monier-Williams "in order that the knowledge and experience so far acquired concerning hydrogen cyanide might be available to all who are directly or indirectly concerned with the use of the gas as a fumigant. The scientific and practical results and conclusions it contains appear to be entirely confirmatory of those which led Dr. Grubbs in the United States and Colonel Glen Liston in India to design cyanide fumigators which would minimize the dangers inherent in the so-called "dumping process." It seems clear that, whatever precautionary rules and regulations may be made, safety to the lives of persons engaged in cyanide fumigation on board ship cannot be ensured except by using a fumigating machine scientifically designed with full knowledge of the difficulties and dangers to be overcome. The advantages of hydrogen cyanide gas, the methods of generating it, its properties, the chemical and other tests of its presence, the fumigation and subsequent ventilation of a ship, the accidents that have happened and the precautions that ought to be observed, are all dealt with in the report, which is illustrated with diagrams and photographs, and includes prints of the Johannesburg by-laws regarding the trade of disinfection by cyanide, of a circular to masters and agents of vessels

[1] Ministry of Health Reports on Public Health and Medical Subjects. No. 19. "Preliminary Report on the use of Hydrogen Cyanide for Fumigation Purposes." By P. G. Stock, C.B., C.B.E., M.B., and G. W. Monier-Williams, O.B.E., M.C., M.A., Ph.D., F.I.C. Published by H.M. Stationery Office. 1923. Price 2s. 6d. net.

regarding fumigation at the port of New York, and an outline of the routine adopted for fumigation of ships there, as well as a note on a cyanogen chloride gas mixture used in the United States. Australian apparatus is described, and notes are given on first-aid treatment of cyanide poisoning. The report leaves no room for doubt either as to the efficiency of fumigation by hydrogen cyanide for the destruction of rats and vermin, or as to the danger to the lives of persons engaged in fumigation when carried out with the more or less crude appliances usually employed. Sir George Newman in his prefatory note expresses the opinion that the procedure must be classed as a hazardous occupation, and raises the question whether the application of the method should be specially restricted by licence. The law of diffusion of gases and the experiments of Graham and Loschmidt referred to in the report point to the conclusion that the complete mixing of two gases by diffusion is a matter, not of minutes, but of hours. Analysis of samples of gas taken in different parts of a ship at various times during fumigation indicated that the diffusion of the gas may be incomplete, and that "for thorough fumigation of large spaces it may be necessary either to increase the number of points at which the gas is generated or to arrange for artificial circulation of the gas." As gaseous diffusion is slow, the clearing of a ship from gas must depend almost entirely upon the movement of air currents in the manner of ordinary ventilation, the atmosphere of the ship being regarded, not as gas, but as poisoned air. In certain circumstances it might be very difficult to clear the gas by natural ventilation without the use of fans, and pockets of gas might remain for many hours or even days in the lower parts of the ship. These considerations are of fundamental importance. It is absolutely necessary to test systematically the progress of ventilation by means of rats or in other reliable ways, and it is dangerous to assume that a certain number of hours is sufficient for clearing under all conditions. The report contains interesting sections on the biological action of the gas on animals and on its detection by physical, chemical, and animal means; the discussions of the biological action on birds and of the chemical tests for the presence of the gas do not seem fully to cover the literature of the subject, and the same criticism is applicable to some other items of information; such omissions, however, are perhaps unavoidable in a report of a preliminary nature. A great part of it is concerned with elaborate details of the precautions necessary to be taken before, during, and after fumigation. They are doubtless necessary when the "dumping method" is used, but it is possible that the emphasis laid upon them may arouse opposition to a very useful and efficient method of disinfection which has been scientifically proved to be without danger when it is carried out with a satisfactory apparatus operated by an instructed personnel.

MEDICAL INCUNABULA.

The great medical library of the College of Physicians of Philadelphia has just issued a *Catalogue of the Incunabula* in its possession. A catalogue of this series appeared in the *Annals of Medical History* some time ago, but since then many valuable incunabula have been added, and now we have a complete descriptive catalogue of all that the Philadelphia library contains of books of that class. The incunabula (books printed before 1500) in the library now number 337, and it is safe to say that no medical library in this country can lay claim to such an extensive collection. The library of the College of Physicians of London possesses 110, but they are not all medical, and smaller numbers are to be found in the libraries of the College of Surgeons and the Royal Society of Medicine. If collections of this class of book are to be made the necessary funds must be forthcoming, and unfortunately few of our medical libraries possess sufficient money for this expensive but very laudable form of book-collecting. Occasionally a stroke of good fortune places in the possession of a library a valuable collection, such as the magnificent bequest of the late Dr. Lloyd Roberts, who in his will left to the library of the Royal College of Physicians of London over 2,000 books, of which more than fifty were incunabula. This may be regarded as an example of the way in which our medical libraries may be enriched, and is wholly worthy of emulation. The catalogue before us is compiled in a most careful and complete manner, and, conforming to Hain, contains all the information necessary for the bibliographer. We congratulate Mr. Charles Perry Fisher, the librarian, on the way in which he has accomplished his task.

FACTORS DETERMINING BACTERIAL VIRULENCE.

In certain of the reports from the pathological laboratory of the Ministry of Health—as, for example, in those dealing with the complement fixation test in syphilis and bacteriological studies on the pneumococcus—the authors, in addition to presenting their own researches, have undertaken a comprehensive survey of the literature of the subject, and passed in review rival theories and opposing hypotheses, commenting on their merits or indicating their deficiencies. Such general discussions have great value. A bacteriological problem is often attacked by different research workers from different points of departure: they may be armed with different weapons of technique, their aim directed at different objectives and inspired by different plans of campaign. An "eye witness" of the assault, not himself a participator, is more competent to adjudicate on the issue and may provide a narrative of historical value, of general interest to all and fertile in suggestions for future policy. In his essay on "Factors determining bacterial virulence," which forms part of one of the recent publications of the Ministry of Health,[1] Dr. Eastwood has recorded no researches of his own, but has provided a dissertation on a problem of immunity which has provoked considerable controversy in the past. The periodic fluctuations in bacterial virulence which to some unknown degree may be responsible for the rise and decline of epidemics, the peculiar immunity of certain species of animals to bacteria highly virulent to other species, the mysterious impulse in obedience to which the normally harmless saprophytes of the human body invade and penetrate the mucous membranes, have not hitherto been satisfactorily explained by the antigen-antibody theories of immunologists. The most refined serological tests have failed to discriminate between the bacterial structure of virulent and non-virulent members of the same bacterial species. "Habit of growth" provides no explanation, for saprophytes may, without apparent reason, swiftly strike and swarm through vital tissues, on the surface of which their innocuous existence has long been tolerated. The presence of some adjuvant may be necessary to permit bacteria to invade the tissues and become pathogenic. This is no new conception, and in his report Dr. Eastwood recalls evidence which bears on this question, directly and indirectly. No positive assertions can be made—there is insufficient unanimity of opinion—but one line of thought has led him to the following hypothesis. It may be assumed that an important distinction between a virulent and a non-virulent strain of bacteria lies in the fact that the former interacts with its animal host in such a way as to produce an environment favourable to bacterial growth within the tissues, whereas the latter fails to do so.

[1] Reports on Public Health and Medical Subjects. No. 22. Issued by the Ministry of Health. H.M. Stationery Office (2s.) or through any bookseller.

These products of interaction between bacterium and host are antigenic, as can be shown by using for immunization the sterile exudate from a fatally infected animal, but the antigenic properties of these products differ from those of purely bacterial antigens and give rise to different antibodies. The struggle between bacterium and host may be regarded as depending on the balance between the output of (1) material which favours bacterial growth, and also acts antigenically, and the output of (2) antibody to this material. "Relative increase of (1) means that the bacteria grow well in the body of their host, and are likely to retain this capacity for vigorous growth if they are transferred directly to a new host. Relative increase of (2) means restriction of bacterial growth and consequently protection for the host." The foundations of this hypothesis are that when bacteria grow in animal tissues special substances are formed resulting in an environment favourable to further bacterial growth; that these special substances act antigenically, and against them the host may manufacture special antibodies. Lest it should be suspected that we are now being introduced to yet another new antibody, of which the number already taxes the memory of the most erudite immunologist, it may be pointed out that the conception of these substances has many resemblances to that of "aggressins" and "anti-aggressins." Dr. Eastwood has found support for his hypothesis from an analysis of the work of many schools of research.

THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH.

THE South African Institute for Medical Research at Johannesburg has a research division and a routine division. The cost of the research division is met by contributions of equal amount from the Union Government and the Witwatersrand Native Labour Association; the routine division is maintained out of the revenue earned from services rendered for payment and from the sale of vaccines and serums. The annual report of the institute for the year ending December 31st, 1922, states that the cost of maintenance of the research division accounted for £9,944, and the routine division £17,272, but the total revenue of this division was £18,993. Some of the main activities of the research division of the institute are concerned with diseases met with also in this country. Epidemic meningococcal meningitis was prevalent on the Witwatersrand from June to September, affecting more especially several of the mining compounds, but also to some extent the general population, both white and coloured. In August the monthly death rate per 1,000 from meningitis amongst the native labourers rose to 0.32, the highest rate hitherto recorded. Forty-eight strains of the meningococcus were obtained from the cerebro-spinal fluid of three European and forty-five African native patients, but twenty-nine of these strains did not belong to any of Gordon's four types. In South Africa there appears to be a rising incidence of infections due to aberrant strains, a fact of some importance since this alteration of types has a direct bearing on the efficiency of antimeningococcal serum, and complicates its production for general use. A ready method for preserving the viability of the meningococcus for transmission in culture to other laboratories has been devised; the whole of a twenty-four hour growth of meningococci from a blood agar slant is planted into a tube of heated ("chocolate") human blood agar whilst the latter is still liquid at a temperature of 40° C. In order to test the possibility of controlling the incidence of cerebro-spinal meningitis amongst native mine labourers by means of prophylactic inoculation twenty-four were inoculated—eighteen subcutaneously and six intravenously—with a meningococcus vaccine. The blood serums of these cases were repeatedly tested for the presence of agglutinins, but in no instance could a trace of agglutination be detected. This entirely negative result does not, of course, preclude the possibility of some immunity having been produced. An outbreak of epidemic influenza which occurred in Johannesburg and the Transvaal afforded an opportunity for search for a filter-passing virus. Naso-pharyngeal washings in normal saline were taken from fifteen patients, in eleven instances within twenty-four hours of the onset of the disease. The washings were passed through filter candles and the filtrates cultured anaerobically in Smith-Noguchi medium. After a period of six to eight days, in the tubes from five of the cases, minute bodies were observed in enormous numbers. Stained films from these were subsequently sent to Dr. Mervyn Gordon and he has advised the institute that the minute bodies therein are indistinguishable from those cultured and described by him. Attempts were made to infect human beings with the filter-passing organism, nineteen individuals volunteering for the experiment. A definite attack of influenza occurred in one individual, the temperature rose to 100° F. or over in two others, with a definite leucopenia in one of them. As the report remarks: "The results obtained in this experiment are by no means sufficiently conclusive to incriminate unequivocally this filter-passing organism as the cause of influenza," although they provide encouragement to persevere with this line of research. An investigation has been undertaken into the effect of freezing on the vitality of the cysts of tapeworms found in "measly" beef and pork. A temperature ranging from −6° C. to −18° C. for a period of about ten weeks is necessary to destroy the vitality of all the cysticerci in carcasses of beef and pork. For safety a margin should be allowed in this period of freezing, and it is suggested that slightly infested beef or pork must be frozen for at least twelve weeks before the meat may be regarded as sterile with respect to cysticerci. The freezing of meat for human consumption at such a low temperature and for such prolonged periods interferes with the nutritive value and subsequent keeping properties of the meat, so that when a carcass is heavily infested it should not be used for human food even after freezing for twelve weeks. These are but three of the many different researches undertaken by workers at the institute during 1922 of which an account is given in the report. The remainder of the report is concerned with the work of the routine division. The total number of investigations carried out during the year was 27,439, an increase of 4,247 on the number for 1921, and three times the figure for 1914, the first year of the institute. All kinds of bacteriological, chemical, and histological examinations are undertaken by the institute. The total number of autogenous vaccines prepared during the year 1922 was 758, and the amount of stock vaccines prepared and issued to store totalled to a volume of more than half a million cubic centimetres!

THE ENERGY OF THE ATOM.

IN his presidential address to the Röntgen Society on November 6th Sir Oliver Lodge took for his subject "X rays and the atom." It was, he said, now quite clear that inside the atom there were definite energy levels—a kind of staircase—at any of which the electrons could rest or revolve in stable equilibrium. When occasion arose an electron could drop from one level to another within the atom and thereby emit a characteristic radiation or spectrum. Why there should be these energy levels, or intervals of stability, no one had yet attempted to explain, and in the absence of explanation it was justifiable to make surmises. He supposed that the nucleus of the atom was in a state of violent rotation about its axis, that the state of circulation in that neighbourhood was comparable with the velocity of light. He even went so far as to assume that the normal ether contained a constitu-

tional rotation, and that upon this, when a pair of electric units were being somehow generated, two equal opposite rotations were superposed, one in opposition to the original rotation, giving a net result of zero, and the other in the same direction, accelerating the velocity. In any case it might readily be granted that around the nucleus there was an ethereal circulation essential to the existence and behaviour of the nucleus, very intense close to the nucleus and decreasing with distance, according to some vortex or ethereal law. This whirl might be stratified; it might continually decrease in speed as distance from the centre increased, and its strata might be described as gravitational or electrical levels. If an electron entering the whirl found itself on one of those levels it could be carried forward by the fluid at that place in a state which satisfied its own requirements. It could abandon itself passively to the fluid of which it was a part, and be not only in equilibrium but at rest. Thus there might be within the atom a permanent circular orbit free from radiation and quite stable until some disturbance occurred. Such a level might be expected at regular intervals whenever the vortex velocity and the attracted electronic velocity had the same value. At the intermediate places there would be no equilibrium, and there the electron would either fly out or fly in according to the circumstances of its propulsion. A particle either entering the atom from outside or being precipitated from one orbit into another within the atom would, starting from radial rest, arrive at any given stratum at an excess speed. It might puncture the stratum and go on, but if it were held it could only be held by overshooting the mark and being brought back again, so that it would perform a series of isochronous oscillations, while its radial energy was being converted, part of it into tangential energy and part into radiation. The restoring force at any point would depend on the speed of the whirl there, and would naturally be more vigorous as the centre was approached. He gave some reasons for supposing that the frequency of this oscillation would be proportional to the energy to be radiated, and that the radiation of energy would be as the square of the restoring force. It might be said, he concluded, that this was shady *ad hoc* reasoning, whereby assumptions were made to explain other assumptions, but the physics of the present century had been so full of assumptions that a few more might be permissible, especially those made with the ultimate object of reducing their number. In response to a vote of thanks, Sir Oliver spoke further of the vast progress in physics of recent years. In physics anything five years old was ancient history. This had been a remarkable quarter of a century, and if the work continued at its present rate the world would, twenty-five years hence, know infinitely more than it knew now.

THE BACTERIOLOGY OF SCARLET FEVER.

In the Journal of October 27th (p. 772) some of the recent research work which has been carried out on the bacteriology of scarlet fever was passed in review, and it was noted that a number of different investigators, amongst them Professor G. Caronia and Dr. M. B. Sindoni, have isolated bacteria of the coccus type from the blood and throats of scarlet fever patients, and these organisms, they claim, have a causal relationship to the disease. It does not, however, follow from this that each investigator is dealing with the same type of organism, and Dr. W. Mair has called our attention to the fact that the organism which, according to Caronia and Sindoni, bears a causative relation to scarlet fever is a minute anaerobic diplococcus which grows only on certain media. Professor Caronia informs us that he has cultured the organisms which he believes to be the agents of scarlet fever and measles on culture media of Di Cristina's type (broth-ascitic fluid-human red corpuscles) and of Tarozzi-Noguchi's type. The exact classification of bacteria of the coccus group is a lengthy occupation. To prove that two cultures, apparently of the same species, are identical, necessitates the employment of serological tests and the exchange of cultures between different laboratories. But there are points of dissimilarity which appear in the description of the organisms isolated by some of these investigators which serve to separate them without reference to this more exacting court of appeal. Thus, whilst Gordon, Bliss, Tunnicliff, and Dick were working with a haemolytic streptococcus, Caronia and Sindoni were dealing with a small anaerobic diplococcus. A more exact classification of this latter organism is impossible at present, but we were wrong in referring to it as a streptococcus.

The Thomas Vicary Lecture before the Royal College of Surgeons of England will be delivered on Friday, December 7th, at 5 p.m., by Sir Arthur Keith, F.R.S., the conservator. The subject of the lecture will be the life and times of William Clift, first conservator. Clift, a Cornish boy, was, in February, 1792, sent with an introduction to John Hunter, who took him as an apprentice without fee on the understanding that he was to write and make drawings, to dissect, and take part in the charge of the museum. Twenty months later Hunter died, but Clift was continued in his employment by Hunter's executors, and in 1800, when the Royal College of Surgeons was incorporated, it appointed Clift to be conservator of the museum. Altogether he was connected with the care of the museum for more than fifty years; he died in 1849.

At the anniversary meeting of the Royal Society on November 30th it will be proposed to re-elect Sir Charles Sherrington, G.B.E., M.D., as president, and Sir David Prain, C.M.G., M.B., as treasurer. Among the members proposed to be elected to the council are Sir Frederick Andrewes, M.D., Professor T. R. Elliott, M.D., and Professor D. Noël Paton, M.D. The King has approved the award of a Royal Medal to Professor C. J. Martin, C.M.G., M.B., for his researches on animal metabolism.

We regret to announce the death on November 5th of Dr. T. H. Green, formerly physician to Charing Cross Hospital and author of a textbook of pathology well known to many generations of students. Dr. Green, who was in his 81st year, was one of the oldest Fellows of the Royal College of Physicians, having been elected in 1875.

After the morning service on Armistice Day (Sunday, November 11th) the Assistant Director Medical Services, London District, and a detachment of the Royal Army Medical Corps will deposit a wreath on the R.A.M.C. war memorial tablet in Westminster Abbey.

At the opening meeting of the University of Paris for the session, on November 24th, honorary degrees will be conferred on eight distinguished foreign men of science; among them are Professor Golgi of Pavia, Dr. W. W. Keen, formerly professor of surgery in the Jefferson College, Philadelphia, Professor Arrhenius of Stockholm, and Sir J. J. Thomson of Cambridge.

At the quarterly meeting of the Medico-Psychological Association of Great Britain and Ireland, to be held at the house of the Medical Society of London on November 22nd, Professor D. C. Winckler will give an address on the psychiatrical and neurological teaching at the Dutch universities, especially at the University of Utrecht, where he is the director of the psychiatric-neurological clinic.

THE YOKOHAMA EARTHQUAKE.

SOME MEDICAL EXPERIENCES.

BY

M. L. YOUNG, M.A., M.B.Cantab., M.R.C.S.Eng.

It may be of interest to relate some experiences of the recent earthquake in Yokohama, Japan, from a medical point of view. Descriptions of the catastrophe have reached the press over and over again, and it is unnecessary to repeat them. The loss of life has not, and cannot be estimated; the fact that the first shock occurred at a time when cooking was in progress for the midday meal undoubtedly added to the casualities, being responsible for the countless cases of severe burns, so many of which ended fatally, and the typhoon not only caused much death by drowning, but also prevented any attempt to rescue refugees by lifeboats for several hours.

All hospitals in Yokohama fell at the first shock, killing or wounding doctors and nurses, with the result that thousands of victims remained without any medical attention for many hours; indeed many hundreds who might have been saved must have been burned to death by the rapidly spreading fire. This enforced delay added also to the appalling sepsis which confronted us when refugees eventually began to arrive on the ships.

The British ship *Dongola* of the Peninsular and Oriental Steam Navigation Company was at the time lying in Yokohama harbour; she is admirably equipped with medical arrangements, but unfortunately her store of dressings had been depleted after the outward voyage, and this added greatly to the difficulties of handling such large numbers of wounded.

Within a short space of time after the first shock, Yokohama was hidden from our view; dense clouds of smoke from burning wreckage and columns of flame eclipsed everything. The harbour was as usual full of lighters, mostly built of wood, many of which contained Japanese cargo workers, both men and women. These were in extreme danger, owing to the increasing typhoon. Many were completely swamped, with much loss of life, but it was possible to rescue from the water some of those who were comparatively close to the ship; such were our first casualties, mostly in a state of collapse. They yielded to simple remedies, and eventually recovered.

After an enforced delay of some hours, it became possible to lower lifeboats, and rescue parties set out to the shore; they brought refugees of all nationalities in their hundreds back to the ship; the majority were damaged, and many extremely badly hurt. Most of the wounds had no covering, and it was evident that sepsis would be present in an appalling degree. Our first case of extreme urgency was an English boy, aged 11 years, whose right arm was smashed in many places, being merely pulp as far as the insertion of the deltoid muscle. The arm was extremely dirty and the child's general condition was so bad that nothing could be done at the time but to give brandy and morphine and to place the limb in a bath of hydrogen peroxide; some hours later it became imperative to remove the arm; the general condition had improved somewhat, and amputation was performed. Owing to the hopeless conditions, the lack of dressings, and the fact that there was no anaesthetist on board, this took two hours; and some five or six hours later the boy died of shock. In another case, in which the hand only was involved, amputation was performed later with satisfactory results.

Broken bones were numerous, mainly legs and ribs, and unfortunately the fractures were mostly compound and comminuted. A great number of cases of acute conjunctivitis, due to long exposure to smoke, were treated. A great many cases required hypodermic injections of morphine, of which there was luckily a good supply; any form of sterilization of syringes or needles was, however, impossible, owing to lack of time, and yet it is interesting to note that under the very dirty conditions in which drugs were given hypodermically no additional sepsis resulted. The stitching up of countless wounds with dirty catgut and hurriedly cleaned instruments also had satisfactory results. The stock of ordinary antiseptics was exhausted rapidly, and until help arrived from the French ship *André Lebon* no iodine was available, and even the supply obtained from this source was absurdly inadequate. The cutting up of sheets and pillow-cases furnished excellent bandages, but the lack of cotton-wool was serious, and frequently to pad splints was impossible. Of stimulants there was no shortage; over forty bottles of brandy and whisky were consumed by the 500 refugees on board within the space of forty-eight hours.

The case of a young Russian child, though deplorable, is of interest; how her injury occurred we could not find out (the problem of trying to understand the many different languages was impossible). She arrived with what appeared clinically to be an appendix abscess developing rapidly into acute general peritonitis; there were no external bruises nor signs of injury; on exploration the abdomen was found to be full of blood, due to a ruptured liver; very little could be done and the child eventually died.

Injuries to joints were common, the most severe being that of a British woman, whose knee-joint was laid open by the falling of part of a building; the wound of course rapidly became infected, and she died on board ship; amputation might conceivably have saved her life, had it been possible to perform it. The Chinese refugees, who on the *Dongola* numbered some hundred and fifty, were in many cases very badly hurt, but none sought help and none uttered so much as a groan; one Chinese woman entered into the first stage of labour while on the voyage from Yokohama, and eventually asked for help. The fortitude and patient suffering of these Chinese men and women were truly extraordinary; one of the women, having a fractured humerus, carried in her arms a baby a few days old only; even in her great anxiety for her child she was patient until the arm could be set.

There were no nurses on the ship, but the British and American women gave of their help so untiringly and worked so well that many lives were saved which otherwise must have been lost. The clothing problem was exceedingly difficult, so many of the refugees being merely in rags. It was possible to supply every refugee in whatever part of the ship with food in plenty owing to the admirable organization of the steward's department.

Our voyage from Yokohama took twenty-four hours, and on arrival in Kobe the Japanese authorities gave every possible aid; excellent arrangements in that place had been made, and we were able to carry out the long task of disembarking the wounded without great difficulty. The more serious cases were conveyed by stretchers across the gangway to ambulances, and on to the International Hospital, where British doctors and sisters in charge of that establishment worked unceasingly to relieve the suffering. The large Oriental Hotel was used as a centre for sorting out the less serious cases, and for relief work, bathrooms and staterooms were rapidly turned into temporary hospitals, and here much valuable medical work was done by Japanese surgeons. British women, themselves refugees in many instances, were everywhere in evidence, giving their voluntary aid unceasingly; many of these women had lost their husbands and children, but I think that the great work they were doing helped for a time to check their tears.

I have said little of matters other than medical. The earthquake itself caused a violent up-and-down movement of the *Dongola*, which resulted in a few minor casualties amongst the crew. Several ships were involved, particularly the *Empress of Australia* and the French *André Lebon*, both of which had narrow escapes from destruction, being moored alongside the burning wharf. Perpetual danger threatened all vessels in the harbour; collision seemed imminent time and again owing to the typhoon and to the fact that visibility was so bad. Lighters and sampans, mostly ablaze, were driven in hopeless confusion amongst the ships by the wind, and the masses of burning oil which poured from the shore upon the surface of the water were a source of intense anxiety. The majority of vessels, however, suffered but little damage, and were finally able to convey thousands of refugees away from the stricken area.

THE HEALTH OF THE SCHOOL CHILD.

We referred last week (p. 828) to the publication of the report of the Chief Medical Officer of the Board of Education on the Health of the School Child in 1922.[1] Having given a general view of Sir George Newman's introductory chapter, in the following paragraphs we deal with the remaining eleven chapters.

In 1922 routine examinations were made of 1,751,122 children, and special examination of 635,628 children considered by parents, teachers, or care committees to show signs of physical or mental defect. Altogether 46 per cent. of all the children at school were examined in the course of the year. Including private practitioners and dentists, the number of officers engaged in the work was 2,162, and of these 226 were women. School nurses, whole- or part-time, numbered 4,135. Parents, it is stated, are learning that while the home is the centre of improvement, the school is a valuable agency, and are contributing to the cost. Dr. Kaye of the West Riding holds that "the head teachers' interest is the cardinal necessity of successful work"; the school medical officers vouch for the value of school attendance officers. Voluntary care committees, as testified by Sir William Hamer, are of great service in following up cases. A special report was prepared on the following up of 100 sick children over a period of ten years, and the graphic story of one of these children occupies several entrancing pages of the Chief Medical Officer's report.

The Young Child.

Sir George Newman estimates that 80 to 90 per cent. of children are born healthy, but that 35 to 40 per cent. of those admitted to school at 5 years of age have physical defects which could have been prevented or cured. The problem, he thinks, is ripe for further consideration in respect of "prevention and amelioration consistent with economy and the prevention of waste." Regulations for conducting nursery schools were issued in 1919, but their establishment is retarded by the need for public economy, and only twenty-four (ten of them in London) have been recognized by the Board; but numerous hopeful "experiments" are being made. Day nurseries are valuable for health and hygiene, though they do not commonly include educational provision.

The reports of school medical officers for 1922 show that, despite the need for national economy, much good work is being done. School sanitation is still in many cases defective, and, as pointed out by Dr. Mulholland (Swinton and Pendlebury), the child's training in hygiene is indirectly hindered by the spectacle of school premises with closed windows, defective illumination, lack of fresh air, and obsolete and unclean lavatory and sanitary conveniences. The teaching of hygiene is vigorously discussed in the report, and the concluding paragraph must be quoted in full:

> "I am satisfied that the effective teaching of hygiene in each school and to each class is of the first importance in all grades of schools—elementary, secondary, proprietary and public schools. If for eight or nine years the child is taught of what personal and public health really consist, immense and incalculable good will result. The child and young adolescent have got to be *trained* in the way of health and physical efficiency. In order to secure this two things are necessary. (i) First, *the teacher must be equipped in the subject.* He is not born with the knowledge: it has to be acquired. A great responsibility rests upon the Training Colleges to provide this preparation for the teacher, a responsibility which I regret to say is not fully appreciated by some of the Colleges, as is proved by many of the answers to the final examination papers in hygiene. The ignorance of some of the candidates is profound; what then are we to expect from the children they instruct? College authorities should give this subject careful attention, and arrange for it to be taught by competent persons who understand the whole question of physical education, including hygiene. (ii) Secondly, *the health instruction in the school must be adequate.* It should be not only information, but direction; it should be not only intermittent and theoretical, but continuous and practical. Every week some definite guidance should be given and repeated until habits are formed. Until hygiene is a habit and a way of life it is of little avail."

Physical Education.

The time given to physical education in the schools is gradually increasing, and special attention is given to it in the training colleges. Of the local education authorities 77 in a total of 317 now employ 133 organizers and assistants, who do not themselves teach the children, but give advice, demonstrations, and encouragement to the teachers. Teachers' classes and vacation courses are held under the direction of the organizers, and may be taught by them. The training is carried on under the direction of the medical department of the Board, which has a staff of inspectors consisting of three men and seven women.

Open-air Education.

The principal forms in which education in the open air is practised are: (1) classes in the playgrounds of elementary schools; (2) classes in public parks and open spaces; (3) school journeys to the seaside or country in charge of teachers; (4) holiday or school camps; (5) open-air classrooms; (6) open-air day schools; and (7) residential open-air schools of recovery. The movement has received the active support of the more progressive local education authorities. It is not costly and ought to be more generally employed.

The Cost of the School Medical Service.

The items by which the total cost of the School Medical Service is made up include salaries of doctors and nurses, travelling expenses, drugs and apparatus, spectacles, and contributions to hospitals and other institutions. The total was in 1912-13, £285,993; in 1913-14, £325,735; in 1914-15, £411,428; in 1920-21, £1,330,182; and in 1921-22, £1,391,606.

The Value of Medical Inspection.

Sir George Newman expresses the opinion that the purpose of the School Medical Service is being fulfilled; though the rate of advance is not so rapid as some may desire, there are no signs of retrogression, and in certain directions the evidence is conclusive of well maintained improvement. In 1920 the percentage of children found defective was 47, and in 1922, 42.2. The subject is discussed in detail under the headings of uncleanliness, vision, and tuberculosis. The service "has achieved signal success in its fight with unclean conditions of body and head existing among school children." Yet it has to be admitted that sometimes the same children come back verminous time after time, so that correction of home conditions is, as urged by Dr. Barlow (Wallasey), fundamental to permanent success. In London in the earlier years the problem was gross infestation, but efforts "have now resulted in the reduction of the cases of body vermin to the small proportion of two in a thousand of the children examined." In girls of 8 years of age perfectly clean heads were present in 79.3 per cent. in 1922, and in only 67 per cent. in 1913.

The statistics given show curious variations in the prevalence of defects of vision. Derbyshire had 12 per cent. of defective cases and Hampshire only 4.4, and in county boroughs the range was from 25 per cent. in East Ham to 5.4 per cent. in Hull. The incidence is much heavier in girls than boys. This is ascribed to difference in the occupational pursuits of the sexes in childhood. Spectacles were prescribed in 24,407 cases, and obtained in 21,266. Mr. Bishop Harman declares that "there is perhaps no range of disease which shows a closer correspondence with dirt than the surface diseases of the eye," and freedom from the various forms of conjunctivitis and lid infections "may be taken as a barometer of that most distinguishing feature of civilization, personal cleanliness." Upwards of 500 ophthalmic surgeons were engaged in school work during the year, principally at school clinics. In many towns squint constitutes a fifth to a quarter of the defects of vision in school children. Mr. Claud Worth says that nearly 75 per cent. of cases of squint appear before the end of the fourth year—that is, before school life begins. Usually when first seen by the school doctor vision is defective or lost, so that there should be "the earliest possible detection and treatment." Glasses can be used with negligible risk at a very early age.

Tuberculosis in active and obvious form is not frequent among children of school age. In 1922 the cases of the pulmonary form reported by local education authorities numbered 19,797, and of crippling due to tuberculosis 11,717. The number of active cases is thought to be about 1.5 per 1,000 children of school age. In London arrangements are

[1] H.M. Stationery Office. Price 1s. 6d. net; by post 1s. 8d.; or through any bookseller.

in force for co-operation between the school service and the tuberculosis dispensaries. Six local education authorities maintain schools for pulmonary cases, and other 27 residential institutions have been approved by the Ministry. For non-pulmonary cases one authority maintains two schools certified as "special," and 27 institutions are otherwise provided, of which 22 are "approved."

Secondary Schools.

The number of such schools inspected in 1922 was 850, and of pupils examined 115,000. The expenditure was £66,000. The work is on the same lines as in elementary schools, and so are the defects found. Deformities are relatively high and suggest that physical training and games are neglected.

Research Work.

Sir George Newman urges that there is ample opportunity for field research work by school medical officers and that "no scientific man or woman engaged in the medical examination of thousands of children should be other than an investigator." That important opinion is given, it may be assumed, on the understanding that the school doctor will have time for such investigation, and will not be compelled to pass by with a sigh matters to which he would gladly devote intensive study if the conditions of his service made it possible. An interesting list of the more important investigations carried out in England during 1922 is given, and two inquiries of special value are reproduced in full. One was the prevalence of deformities resulting from rickets, by Dr. H. P. Newsholme, county medical officer of health for the North Riding of Yorkshire. The other was on a domestic outbreak of encephalitis lethargica at Eastbourne, by Dr. Allan C. Parsons, medical officer of the Ministry. Both are excellent bits of work. It is also pointed out that intensive medical work in schools revealed to Colonel James and Dr. Parsons that the malaria parasite might be found in English school children and that non-imported ague still lingers in a few districts in this country haunted by the anopheles mosquito.

Treatment of Elementary School Children.

Statistics are given showing the number of authorities which have made arrangements for medical treatment, the type of provision, the number and work of school clinics, and the conditions dealt with.

School clinics have been provided by 297 authorities; in London there are 57 clinics (called medical treatment centres) and in addition arrangements have been made with fourteen hospitals. In 1922 arrangements with hospitals were made by 186 authorities, and the number of hospitals undertaking subsidized work was 381. Eye defects, tonsils and adenoids, ringworm, minor ailments, and miscellaneous defects were dealt with.

Treatment of minor ailments was provided by 303 authorities; at Sheffield there were 174,000 attendances and 28,488 examinations. At Liverpool the attendances were close on 200,000. *X*-ray treatment of ringworm was provided by 145 authorities. In London ringworm cases are becoming less numerous. Middle-ear disease receives much attention, and three forms of treatment are prescribed: (1) the application of antiseptic or drying powders; (2) the coagulation of albumin by zinc ionization; and (3) surgical operation. Of 1,727,314 children medically inspected in "Routine Groups" in elementary schools, 4.6 per cent. were referred for treatment of tonsils and adenoids, and 4.7 per cent. more were kept under observation. In the "Special Group" of 624,318 children, 4.6 per cent. were referred for treatment and 2.6 per cent. kept under observation. In London the incidence of such cases is diminishing.

Stammering and other speech defects are treated by only a relatively small number of authorities. Classes have been established in Manchester, Barry, Smethwick, and London, with very considerable percentages of cure.

School Nurses.

The functions of the clinic have developed. It began as a treatment centre, but is now also a health centre and ought likewise to be a research centre. In addition it is now, in well organized areas, the administrative centre for the service. Staffing, equipment, and buildings should therefore, it is said, be on a sufficient scale. The school nurses' duty is to aid the school medical officer in his work and to co-ordinate that work with the activities of other departments dealing with public health.

Dental Inspection and Treatment.

Of 317 education authorities, 244 now provide dental work. The school clinics equipped now number over 600, and attendances in England and Wales in 1922 were 4,588,934; about 1½ millions of inspections were made by dentists, over a million cases were referred for treatment, over 570,000 were treated, and 137,000 re-treated. In ten years there has been a great and cumulative improvement. Apart from emergency treatment, school dentists should, it is held, concentrate on children between 6 and 8 years of age.

Orthopaedics.

The types of cases dealt with include (*a*) tuberculosis of bones and joints, (*b*) paralysis, and (*c*) congenital or acquired deformities—rickets, talipes, scoliosis, etc. Cripple children constitute 0.5 to 1.0 per cent. of the school population; nearly a third of the cases are due to tuberculosis. About 80 to 90 per cent. of the cripples are curable to the extent of enabling them to take part in industry, if the disability is dealt with early and competently. The provision for treatment includes hospital schools; orthopaedic and after-care clinics; physically defective or cripple schools; remedial exercise clinics, and vocational courses for persons over 16 years of age.

Defective Children.

Special schools for defective children are very expensive and the Board urges stringent economy. The number of defectives—blind, deaf and dumb, mental cases, tuberculous cases, cripples, etc.—totalled 152,100 in 1922, of whom 127,600 were found at elementary schools. There is accommodation for fully 40,000 in special schools throughout the country, including over 14,000 in London. There are 32 institutions recognized for training blind and other defectives over 16 years of age.

The Mentally Abnormal Child.

Two types of mental abnormality are recognized—the dull and backward, and the feeble-minded. If the best is not made of them the result is apt to be unemployability, delinquency, and crime. In London the number of "backward" school children between ages 8 and 14 is estimated at 10 per cent. If the same percentage applies, the total for the country will be not less than 600,000. The large majority can be taught in ordinary elementary schools, especially in special classes under special teachers. Reference is made to the tests for mentally defective children, and it is noted that "educational" and "intelligence" tests give mutually confirmatory results, but Mr. Shrubsall states that shyness, obstinacy, or irritability may affect their application. It is believed that in every 1,000 children in average attendance there are twelve "educable" mentally defectives, or, say, 50,000—certainly not less than 30,000—for England, whereas the special schools have only 16,200 places. Estimates differ as to the percentage that can become fit for remunerative work. The duty of the school medical officer is to classify cases and enable his authority to "clear" them.

School Meals.

Power to supply meals was given to local education authorities in 1906, and in 1914 they were authorized to provide them during holidays. The degree to which these powers have been exercised has varied between year and year; the maximum was reached in 1921-22, when 190 authorities fed 592,518 children at a cost of £983,182; of this amount £15,822 was received from parents. The cost for 1922-23 is not known yet, but only 148,536 children were fed, and the total expenditure to be recognized by the Board was limited to £300,000, the responsibility of the guardians of the poor being pointed out, as school meals are not intended to be a form of poor relief.

On the question of the nutritional condition of children while wages were high during the war, opinions of medical officers vary, but most of them believe there was improvement. In 1922 health and physique were at least as good as

before the war. Sir George Newman thinks this may be due partly to an increased sense of parental responsibility, partly to insurance and union and other payments, and partly to the supervision and assistance of the school medical officers. The £300,000 provided much "supplementary" food, and probably "a substantial amount of the excessive school feeding undertaken in 1921-22 was not necessary to health or life."

PHYSICAL EFFICIENCY AND JUVENILE EMPLOYMENT.

One of the objects of the School Medical Service is to fit the child physically for industry and to prevent premature employment. The Education Act of 1921 forbids the employment of a child under 12 for gain, and limits the employment of children under 14 on school attendance days, besides giving local education authorities power to make by-laws as to morning and evening and Sunday employment. Of 317 such authorities, 297 have made by-laws. The Board issued a set of questions to the authorities, and the replies show (1) that certain unsuitable employments—in public-houses, slaughterhouses, and barbers' shops—have been stopped; (2) that certain permitted employments are controlled and supervised, and their juvenile workers periodically reinspected; (3) that most authorities require a medical certificate of the suitability of the employment proposed, that nearly all have adopted a system of registration, that many make employers responsible for waterproof garments and footwear; (4) that prompt treatment of defects is secured; and (5) that partly employed children attend school in a condition enabling them to benefit by the attendance. Much advice is given as to the suitability of proposed whole-time employment; and prospective employers may be advised as to physique, temperament, intelligence, and personality, so that not only shall the worker be fit for the work, but the work shall be the best for the worker.

WEYMOUTH AND DISTRICT HOSPITAL.

OPENING OF NEW *X*-RAY DEPARTMENT.

THE James Miller Memorial Wing, which takes the form of a new and elaborate *x*-ray department, in memory of the late Dr. James Miller, for many years on the staff of the hospital, was opened on Saturday, November 3rd, by Sir Humphry Rolleston, K.C.B., who was supported by Dr. A. E. Barclay of Manchester. Apologies were received from Sir Charters Symonds, K.B.E., who was unfortunately indisposed, and others.

Previous to the opening ceremony, about fifty of the leading practitioners of the county, and some of the prominent residents of the town, were entertained to luncheon by the chairman of the hospital, Mr. A. Clarke. The opening ceremony took place at 3 p.m. at the hospital, in the presence of a crowded gathering. Mr. Clarke made a few introductory remarks as to the development which had taken place at the hospital. In introducing the President of the Royal College of Physicians and Dr. Barclay, he said how fortunate the town was in having men so eminent in their profession to address them.

Sir Humphry Rolleston's Address.

Sir HUMPHRY ROLLESTON began by remarking that at a time when financial stress was forcing many hospitals to close wards the addition of a wing for an expanded *x*-ray department spoke well for the generosity of the Weymouth public and the energy of that hospital's authorities. This important improvement was appropriately dedicated to the memory of Dr. James Miller, who for fifteen years devotedly served the hospital, and died within its walls on November 9th, 1918, from lung complications of influenza. Like many unselfish men of his profession, he neglected himself in order to care for others, and went about his work with a temperature of 104° F.—a sacrifice which he certainly would not have allowed anyone else to make. Always willing to help in any capacity, generous and sympathetic, he was the friend of the poor, but did not let his light shine prominently before men. Often such a life had its only memorial in the gratitude, genuine though necessarily transient, of the poor; fortunately his relations, colleagues, friends, and patients had determined to perpetuate the good work he had silently carried out by erecting and equipping a new *x*-ray department. Röntgen of Wurzburg discovered *x* rays when working with a Crookes's high vacuum tube electrically excited in November, 1895, and it was therefore a great Englishman, Sir William Crookes, whose work rendered this discovery possible. Röntgen died on February 10th last, and thus had the satisfaction of seeing the enormous advances that his observation had rendered possible, not only in pure science but in its practical application, especially in the art of healing. Those who were in practice before radiology became the handmaiden of medicine and surgery knew what a revolution had taken place in the accurate detection of disease. Unlike many great advances in medicine, the use of *x* rays was at once taken up most enthusiastically, and, though its professional application took some years to develop on account of many technical difficulties, it was never neglected or opposed. First employed for the detection of fractures, foreign bodies, and calculi, *x* rays were in 1896 applied by J. Macintyre of Glasgow to the diagnosis of intrathoracic disease, such as aneurysm; about ten years later pyelography came into vogue. Sir Humphry Rolleston then gave a few examples showing that advances were constantly being made. The introduction of gas into the abdominal, cranial, or even other cavities before an *x*-ray picture was taken was now employed to define more clearly the position of a tumour. Jacobaeus's thoracoscopy and division of pleuritic adhesions under the *x* rays opened new possibilities in the treatment of pulmonary tuberculosis by artificial pneumothorax; Sicard's method of localizing the level and extent of spinal fractures, adhesions, or tumours obstructing the intrathecal space by means of injections of lipiodol before the spine was *x*-rayed was a most promising aid to diagnosis first reported in this country by Percy Sargent. The demonstration of gall stones had been followed by that of other pathological changes in the gall bladder, and the discovery by Forsell of Stockholm that the mucous membrane of the gastro-intestinal tract underwent active movements, apart from the coarser contractions of the muscular coat, and thereby controlled the distribution and regulation of the contents of the bowel, held out important possibilities.

In diagnosis the *x* rays had provided an additional sense or new eye, and their extension of the field of vision was comparable with the advance made when microscope lenses and telescopes were first introduced. In the twenty-eight years since *x* rays were discovered the mental attitude of clinical workers had gradually undergone a change, the magnitude of which was only realized when a medical man found himself in some place where *x* rays were not available for help in a case of doubtful diagnosis.

X rays were not so widely employed or so well established in treatment as in diagnosis. In some skin diseases and superficial tumours their beneficial influence had been proved beyond question, and the autolytic effect of irradiations had been utilized in uterine fibromyomas, prostatic hypertrophy, erythraemia, exophthalmic goitre, metrorrhagia, lymphadenomatous and other enlargements of glands, and chronic tonsillitis, and good results in other affections might confidently be anticipated. But remedies powerful for good were not without risk when employed in large doses, and the dangers attaching to *x* rays were now fully recognized.

In conclusion, Sir Humphry Rolleston said that, important as was a thoroughly complete and up-to-date equipment, the first essential was that there should be a competent radiologist in charge of the department, and the Weymouth and District Hospital was most fortunate in having the services of Dr. Rodier Heath, who for fifteen years had been the pioneer in that town, which thus provided a valuable centre for radiological work.

Dr. F. H. RODIER HEATH, the medical officer in charge of the hospital, outlined the progress of *x*-ray work in the town, and said that from a very small street where he began his work fifteen years ago—when all they had was one small room with a 10-inch coil—they had gradually developed to their present state of efficiency, as evidenced by the fact that exposures which formerly took two minutes could now be done in a fraction of a second. He had no hesitation in saying that the equipment at Weymouth was well up to the standard of any department in the West of England. He said how much the presence of such distinguished men as Sir Humphry Rolleston and Dr. A. E. Barclay would help on the work of the department for which he was responsible, and added that he had incurred a debt to Dr. Barclay he could never repay for much valuable help for many years past. He looked upon the magnificent *x*-ray department at Manchester as his ideal.

Dr. A. E. BARCLAY, of the Royal Infirmary, Manchester, expressed his pleasure in supporting his friend Dr. Rodier Heath's good work, and outlined the progress of *x*-ray work in Manchester from the time—some fifteen years ago—when he first took charge of the department and they had only one small room and a dark room. At present they had nine sets of apparatus and a large staff of experts. *X*-ray work required a highly skilled specialist and the work called for a trained eye and brain. During the daily work at the Royal Infirmary, Manchester, there was an interval of half an hour, during which they

were served with coffee, and this half-hour was of the utmost value because during that time they met the members of the surgical and medical staffs and discussed their cases.

Mr. H. H. Du Boulay, the senior surgeon of the hospital, proposed a vote of thanks to the speakers, and this was seconded by Dr. James Macpherson Lawrie, Deputy Lieutenant of Dorset, to whom the present fine building owes its existence. Lord Ellenborough, chairman of the Dorset County Hospital, also spoke and added his testimony to the great assistance which the *x*-ray department at Dorchester—also under the charge of Dr. Rodier Heath—had been to the medical and surgical staffs.

The New Installation.

At the close of the meeting an inspection was made of the new wing. The main room is a large and lofty one, well lighted by three large windows fitted with wooden roller blinds to exclude the light. Electric fans are used for keeping the atmosphere pure. There is a Snook transformer fitted with auto-control and time switch, capable of an output of 80 milliampères through the tube; a screening stand, radiographic couch, and various tube stands; and a special couch for use with the Potter-Bucky diaphragm. In another room is a 16-inch coil used for therapeutic work, and great attention has been paid throughout to provide ample protection for the operators. Coolidge tubes are used for treatment and diagnosis and water-cooled and Macalister Wiggin tubes for radiographs. The department also contains the usual dark rooms and office. The apparatus was supplied by Messrs. Newton and Wright and the Cox-Cavendish Electrical Co. The erection and design were carried out by Mr. T. H. Escott, electrical engineer, Weymouth. The Weymouth and District Hospital is a fine modern building, standing in its own extensive grounds, with a private nursing home attached, and is situated just outside the town.

Paris.

[From Our Correspondent.]

As the leaves fall so do the doctors return. The medical world of Paris begins to wake up, and the medical societies are announcing their first meetings for the session. It is curious to observe the change the war has worked in the habit of life of the Paris doctor. Nowadays the word "*vacances*"—what you would call the long vacation or the autumn holidays—expresses for us a right if not a duty. Many indeed are the doctors, and among them some of the busiest, who give themselves leave for two good months. Their patients agree that it is necessary, and as a matter of fact all sections of society do very much the same. Then, for goodness' sake, let not our foreign brethren take study leave in Paris in summer; the *mot d'ordre* there is—go easy.

At that time of year the centre of medical activity is transferred to our thermal stations. There it is intense. Never have our watering places been so thronged, so sought after, as during the summer just passed; all of them are publishing statistics; each one of them is a record.

The causes are manifold. One is that the war sent marching through France millions of men who then learnt to know their own country. Another is that when suddenly our health stations were converted during the war into great centres of hospitalization they had to be thoroughly equipped for the work, and to their previous therapeutic resources was added an arsenal of new methods for physical treatment. In this way they have won quite a new sort of reputation. There has grown up in the public mind a very remarkable belief in what are called natural methods—light, water, air, the simple life—and the belief in chemiotherapy has correspondingly declined. Every day some patient will say with a certain naïve air of superiority, "I don't take drugs," and this type of patient is predestined to go to a spa, where a scheme of treatment has been systematically planned out and the indications for the use of the waters published far and wide.

International conditions have been especially favourable to France this year. The German spas have not been able during this time of instability to attract visitors, even though the least of them might, when he handled the German currency, fancy himself a millionaire. Moreover, the exchange conditions have brought to France crowds of visitors who in former times would never have dreamt of making the journey, but who nowadays find themselves able to live luxuriously in the best hotels at prices lower than those of their ordinary life at home. The spas in Czecho-Slovakia have suffered from a cause the converse of this, for in that country exchange rates have considerably improved but there has been no corresponding fall in prices. They have been deserted in favour of greater but poorer rivals. *Beati pauperes.* This unexpected success did not take the French watering places by surprise; their response to the demand on them was limited only by the accommodation available.

Another consequence of the movement which has carried these crowds to thermal stations has been its effect on members of the profession. A well recognized law of political economy is here once more in operation. Some of the most distinguished doctors, certain of a successful career whatever road they took, have chosen that of thermal medicine, which once upon a time was rather despised. The development of hydrology has been quickened by these reinforcements. No longer is it considered sufficient merely to observe patients who present themselves for spa treatment or to build a special clinic. A new spirit of inquiry is evident, and the thermal stations have become centres for research and original investigation. A hospital of a thermal station provides the nucleus round which the laboratories can cluster. There is a rich clinical material in the innumerable patients, constantly replaced by newcomers from all parts of the world. The scaffolding for the study of preventive medicine of the future is being put up in the French watering places, which are serving also as links in the chain of international medicine, so that we can claim that medicine is playing a great part in maintaining the entente, the cordiality of which does not depend on the humour of political virtuosos. The old tradition that medicine knows no frontiers is being revived. It was in England that this sentiment of the international solidarity of medicine first gained strength; it was in the heart of a British member of the profession that the dream of an international society of hydrology was formed; and it was the brain of another which brought the idea to fruition; it was received enthusiastically in France, which was only sorry that it had not originated the idea.

England and Wales.

Vital Statistics for 1922.

The Registrar-General's Statistical Review for 1922 is a very "figurative" volume[1]—nearly 500 pages packed full of numerals, not as an appendix to something, but only with a table of contents preceding the figures. The salient features are as follow. The births in the year were 780,124, being 68,690 fewer than in 1921. They yield a birth rate of 20.4 per 1,000 living, this being the lowest rate yet recorded. The deaths were 486,299, being 27,600 more than in 1921, and yielding a rate of 12.8 per 1,000. In 1921 the rate was the lowest on record, 12.1, and 1920 also had a lower rate than 1922, so that 1922 stands only third in order of healthiness as measured in this fashion; nevertheless any of these rates would, if he could come to life again, excite the astonishment and admiration of Dr. William Farr, the first of the Somerset House statisticians, and in this country the father of the modern science. He separated out from the rest of England all the areas which had an exceptionally low mortality, and classed them under the title "healthy districts." And the figure which he chose as the criterion of healthiness was the death rate of 17 per 1,000 per annum. Such places were set on a pedestal for the emulation of the rest of the country. Later there had to be made a new standard, and 15 per 1,000 was adopted. The change is indeed wonderful. As to infant mortality, the total deaths under one year of age were 60,121, equal to a death rate of 77 per 1,000 births. That is the lowest rate ever recorded in this country, and, making every allowance for seasonal influences in respect of summer diarrhoea and epidemicity of children's acute infectious diseases, the 77 rate represents

[1] Tables, Part I, Medical. H.M. Stationery Offices. (Royal 8vo, p. 491. 15s. net, by post 15s. 6d.)

a triumph of well directed infant welfare work. The natural increase of population by excess of births over deaths was 293,895, equivalent to a rate of 7.6 per 1,000 living.

The Banks Memorial Lecture.

Sir Arthur Keith, F.R.S., delivered the Banks Memorial Lecture of the University of Liverpool on November 1st. The Vice-Chancellor (Dr. J. G. Adami) presided, and there was a large attendance of medical men and students. In introducing the lecturer, the Vice-Chancellor set forth the circumstances in which the memorial lecture was instituted, and Sir Arthur Keith added some personal traits of Sir William Banks culled from a paper—largely autobiographical in character—which Banks had written. The lecture, an account of which is given elsewhere (p. 888), dealt with the origin and nature of hernial formation. It was illustrated by freehand drawings and its delivery was accentuated by appreciative applause by all present. In the evening the biennial dinner of the Liverpool Medical Institution took place. Dr. J. Hill Abram was in the chair and Sir Arthur Keith was the guest of honour. Its success was largely due to the efforts of Dr. Murray Cairns, who unfortunately was not able to be present.

The London County Council's New Mental Hospital.

The eleventh mental hospital under the control of the London County Council, which is now approaching completion, is to be known as the "West Park Mental Hospital"; the name originally chosen, and since abandoned, was the "Epsom Common Mental Hospital." Although the hospital is not yet ready for occupation, so many questions in connexion with equipment and administration are arising that it has been deemed advisable to appoint, without delay, the first medical superintendent, who is Dr. Norcliffe Roberts. He has been a deputy medical superintendent in the mental hospitals service, and has acted recently as medical superintendent at the Ministry of Pensions Neurological Hospital, Epsom. The salary is £1,200 a year (based on pre-war economic conditions, with the emolument of an unfurnished house (rates, taxes, and water supply free). The salary is subject to certain temporary additions, in accordance with the cost of living scale, which bring it at the present time to a total of £1,419.

Health of Birmingham.

The birth rate in Birmingham in 1922, based on a population of 927,844, was 21.5 per 1,000, and the death rate from all causes 12.1 per 1,000. The infant mortality rate was 86 per 1,000 births. The highest birth rate (30.8 per 1,000) was in St. Mary's ward, the highest death rate (16.7 per 1,000) in St. Martin's and Deritend ward, and the highest infant mortality rate (117 per 1,000) in St. Mary's ward. The extension of the city boundaries at the beginning of the present century by the inclusion of a large number of outlying districts has naturally caused a fall in the recorded death rates, which might well be more apparent than real. It is satisfactory to find therefore that in Birmingham as at present constituted the death rate from all causes has fallen from 15 per 1,000 in 1906 to 12.1 in 1922, and that the infant mortality rate has fallen during the same period from 157 per 1,000 births to 86 per 1,000. One of the most pressing needs of Birmingham appears to be an increase in the number of houses for the working classes. Overcrowding, writes Dr. Robertson, is still very acute, and a large number of houses must be erected before the overcrowding is reduced. Some of the overcrowding and discomfort which at present exist is about as bad as it is possible to imagine in a civilized country not in a state of war. Instances are reported in which father, mother, and four or more children have to live and sleep in one room, often an attic, with inadequate cooking accommodation, with no proper food store, no water supply, and no means of getting rid of slops. During the three years 1920-22 the corporation erected 2,279 dwellings, and about a thousand were built by private enterprise, the latter mostly of the small villa type. In ten wards in the city with a total population of over 350,000, not a single house was built during the three years. Dr. Robertson urges the necessity for proceeding energetically with the erection of dwellings by public enterprise. It is at present useless to expect help from private enterprise, for the reason that the private investor who used to put his capital in this type of investment is now hedged round by so many restrictive conditions contained in recent legislation that an owner of small house property has always been regarded in the eyes of the people as a rapacious individual to the proper care of whose property not the slightest regard need ever be paid.

The prevention of tuberculosis is prominent among the activities of the Birmingham health department. Among the duties of the tuberculosis visitors are those of inducing patients to obtain early treatment, and of inculcating the general principles which tend to prevent the spread of the disease in the home. During 1922 they found among the 2,040 primary cases visited no fewer than 1,054 patients who shared a bed with another member of the family, 269 were sharing a bedroom, and in fifty cases fresh air was not being obtained by means of open windows. In order to remedy the crowding of the healthy with the affected members of a family sets of beds and bedding are supplied to patients through the public health department, sometimes on loan and at other times at cost price or on the hire-purchase system. Among 228 samples taken from milk produced outside the city, 8 proved to contain living tubercle bacilli. Visits by a veterinary inspector to the farms concerned resulted in the slaughter of seven cows giving tubercle-infected milk. The scheme under which the cows of certain dairy farms from which milk is sent to Birmingham are tested periodically with tuberculin was continued during 1922 with respect to 19 herds. The newly tested cows and those tested for the first time numbered 427, and of these 104 failed to pass the test.

Scotland.

Centenary of Royal (Dick) Veterinary College.

The Royal Veterinary College at Edinburgh celebrates this month the centenary of its commencement. It began in November, 1823, as the Highland Society's Veterinary School, with a course of lectures by William Dick. In 1916 the College removed to new premises which had been erected near the University, but the funds necessary to complete the new college buildings have not been forthcoming since the war and the centenary is being made the occasion of a special appeal to the public for help. The proceedings will begin on Tuesday, November 27th, with an "at home" in the Veterinary College, when Sir John MacFadyean will present a portrait of William Dick, the founder, to the College, and Dr. Theobald Smith will give an address on comparative pathology. On Wednesday, November 28th, an oration will be delivered by Sir John MacFadyean and afterwards there will be a dinner at the Royal College of Surgeons. From Thursday, November 29th, to Saturday, December 1st, a bazaar is to be held in aid of the College Building Fund; it will be opened on successive days by Earl Haig, the Duchess of Atholl, and Lady Craig.

Housing in Scotland.

A statement recently issued by the Scottish Board of Health shows that the houses completed in Scotland in connexion with the State-aided housing schemes down to September 30th, 1923, numbered 22,469 houses, and those under construction 3,143. Under the private subsidiary scheme 2,280 houses had been completed, and in connexion with these the Scottish Board of Health had paid out £545,590 in subsidies. A memorandum issued to the Town Council of Edinburgh states that 1,724 houses have been or are in process of being erected. Of these, 246 are of two rooms, 1,029 of three rooms, 266 of four rooms, and 83 of five rooms. The total expenditure of the Corporation was about £1,250,000, of which about 84 per cent. was borne by the State. There is stated to be an urgent necessity for 1,000 new houses, and unless some new system of building is discovered to meet this emergency the reconstruction of slum property is doomed to further postponement.

Report of Midwives Board for Scotland.

The annual report of the Central Midwives Board for Scotland, covering the year to March 31st, 1923, states that the total number of midwives enrolled in Scotland is 5,477, of whom 2,157 have been admitted after examination by the Board, and 3,320 exempted as holding recognized certificates or through having been in bona-fide practice at the passing of the Act. The number of these midwives actually practising at the present time is about 3,000. The names of eight women were removed from the roll during the year. A proposal to increase the period of midwifery training to twelve months in the case of untrained women and to six months for those holding certificates in general nursing has been approved as a general principle, and the Board will make arrangements with the English Board to put it into force if the sanction of the Board of Health to the scheme is obtained.

Ireland.

Melanosis Derived from the Eye.

The first meeting of the Ulster Medical Society for the session was held in the Medical Institute, Belfast, on October 25th. Mr. R. J. Johnstone, M.P., F.R.C.S., introduced the incoming President, Dr. W. St. C. Symmers, Professor of Pathology in Queen's University, Belfast. The new president proposed, and Dr. Calwell seconded, a hearty vote of thanks to Professor Johnstone for his labours for the Society; this was passed by acclamation. Professor Symmers then gave an address. He began by making sympathetic reference to the deaths of members of the Society that had occurred during the past year—Dr. Mary Slade, Dr. Alex. Burns, Dr. W. MacDermott, Dr. H. L. Warwick, and Dr. M. O'Malley. The address consisted of a lucid explanation of a very large number of specimens from three oxen slaughtered in the city abattoirs; they were instances of generalized pigmentation, which Professor Symmers traced from an enormously thickened pigmented layer behind the retina; the optic nerve was deeply stained and a cross-section under the microscope showed a beautiful tesselated appearance, where the pigment had been carried in the lymph stream of the nerve. The brain, the lungs, larynx, and some portions of the liver and kidney were affected; the cartilage of the larynx and bronchi were slightly coloured, as were also lymph glands, the heart, the arachnoid membrane of the brain, and the theca of the cord. He was unable to explain why the pigmented layer behind the retina had become so enormously hypertrophied, but suggested that the pigment, which was very insoluble, had been carried by the lymph stream back by the optic nerve till it finally reached the main lymph channels and so entered the general blood circulation. The lymph spaces in the optic nerve and adjacent parts were crammed full of this pigment, which saturated the pia mater and radiated out into nerves. This form of melanin proved very insoluble and non-irritating. One of the animals was known to be blind. In ochronosis, cartilage was pigmented, but in these cases only the cartilages of the larynx and trachea. Melanotic sarcoma was a dark sepia brown; this was black. He had never seen a similar affection in the human being. Mr. Kirk proposed, and Dr. T. Houston seconded, a very hearty vote of thanks to the President for his address.

Free State Army Pensions Act.

It has been stated that the Army Pensions Act, passed by the Oireachtas, is to come into full force at an early date. An Army Pensions Board has been constituted, and an Army Pensions Office has been opened at 34, Molesworth Street, Dublin, to which all applications will be made for wounded soldiers' pensions, or for allowances and gratuities due to the widows, children, or dependants of National soldiers. The setting of the machinery of the Army Pensions Act in motion will involve the passing of a supplementary estimate by the Dail, and, in all probability, the Minister for Finance will ask for the money at an early date.

Mr. Cecil Lavery, B.L., has been appointed Chairman of the Army Pensions Board. Other members will be: (1) a representative of the Ministry of Defence, probably General Mulcahy; (2) a representative of the Army Medical Services, almost certainly Major-General Morrin. In addition, there will be members who will interview applicants, etc. Applications must be made through the Ministry of Defence, and the verification of claims will be carried through the Adjutant-General's Office. The scheme of the Pensions Act is comprehensive.

It provides "for the payment of wound pensions to members of Oglaigh na hEireann, including the Army and the Irish Volunteers, and also of the Irish Citizen Army of 1916." Thus the Act embraces the whole service period of the Irish Army back to Easter Week, 1916, but pensions can only begin from April 1st, 1922, when the National Army was first engaged in the struggle with Irregulars. Pensions will be paid to discharged officers, non-commissioned officers and men whose degree of disablement is from 20 per cent. to 100 per cent. In the case of officers and men whose degree of disablement amounts to less than 20 per cent., lump-sum gratuities, not exceeding in the case of an officer £100, and in the case of a non-commissioned officer or man £60, may be determined. Wound pensions to officers range from £40 to £200 a year; in the case of non-commissioned officers and men from 8s. 4d. a week to 42s. a week. Additional sums are payable to married officers, and range from 3s. a week to 15s. a week, and to married non-commissioned officers and men additional sums of from 2s. to 10s. a week will be payable. The second schedule of the Act provides for the payment of allowances to the widows and dependants of deceased officers as follows:

Widow—£90 a year during widowhood and £120 gratuity on first remarriage. Each child—£24 a year while mother is living, and £40 if orphaned; 18 is the age limit for boys and 21 for girls. The amount expended on the education of the children between the ages of 12 and 18 will be refunded, but must not exceed the annual sum of £35. Other dependants, to the number of one in each case, will receive £1 a week.

The allowances to the dependants of soldiers are as follows: Widows—17s. 6d. during widowhood, and a gratuity of £45 10s. on first remarriage. Children—5s. a week for first child while mother in living; 8s. 6d. a week for orphaned children, same education facilities as in officers' allowances in certain cases. There also is provided a pension of 15s. a week for a soldier's dependent mother, or for a father who is over 60 years of age, or who is incapacitated by ill health. Only one such allowance, however, is payable.

Correspondence.

THE UNIT SYSTEM IN SURGERY.

Sir,—As the head of a "surgical unit" I am interested in Mr. Souttar's letter in your issue of October 27th. I write here of the general desirability or otherwise of the unit system; not of our own recently established unit in the Welsh Medical School, established in a hospital where there was previously no regular clinical teaching, where organization is still in progress, and where there are naturally special problems and difficulties. On the general question I consider it an improvement to appoint in a large teaching hospital someone as organizer of surgical work and director of surgical teaching. This can and should be done without interfering with the position and full liberty of the rest of the surgical staff, to whom the "director" should be really an assistant. I regard the term "unit" as ill chosen; the whole surgical staff should be the unit. The director looks after the surgical side of the hospital. He has assistants, he has an "office." He has his beds and out-patient department. With his colleagues he constitutes a "Board of Surgical Studies," under which he sees to the distribution of work, facilitates the observation of different groups of cases, and organizes teaching and research. Laboratories, library, record office, and workshops are under his supervision. The work of the many surgical special departments is known to him and by him integrated with the general work. There is one harmonious body of men working by diverse methods for the advancement of surgical knowledge. There is no overlapping and full co-ordination.

The director helps in effecting the integration of the earlier with the later (clinical) studies and in maintaining liaison with the medical side. As a professor in the university of which the school is a part, he helps to bring to the school academic advantages. In teaching he knows and watches the career of every student and guides each through his studies.

I visualize such a man as about 45 years of age on appointment. One who has had good experience of hospital work, of pathology, of research, and of specialist surgical practice. I condemn—what may possibly arise in the future—a man

taking the post who has had no experience of private practice and whose career has been purely hospital, laboratory, and academic.

With regard to research, some of the director's time can be definitely set aside, granted efficient assistance in other work and when organization is complete. Every new patient and every operation brings opportunities for original research.

Private practice should, in the ordinary sense, not be allowed. In a provincial town at all events the most amicable relations with hospital colleagues are best assured by the professor-director not competing with them. His ordinary working time will be fully occupied and he should be fresh and vigorous for his work, which will not be the case if, for example, an exhausting hospital day is followed by a journey into the country to operate on a suppurating appendix. If the hospital has a private clinic then the director can take his share in its work, including, say, half a day once a week for private consultations at the hospital. Thereby he largely maintains his experience of the whole field of practice, his abilities in all directions are recognized by his students, and there is some addition to his emoluments, all this rendering the appointment more attractive. The pay should be adequate, such as will attract good men from a line of private practice in which the earnings are large. Choice will be limited if only those with a private income apply. The director should be able to maintain as good an external and social position as his hospital colleagues. Incidentally his "budget" should include grants in aid of visits to other clinics.

I am writing of one attached to a hospital of the metropolitan type, but the necessarily utilitarian aspect of such a hospital does not usually provide the best and most diversified material. The ideal is a university hospital which, while fulfilling a public need, is wholly a constituent of the university medical school and is specially organized for research and teaching. I recognize the special difficulties in London, but that they are not insurmountable is shown, for example, by the organization of the surgical unit at University College Hospital.

In conclusion, I refer to certain points in Mr. Souttar's letter. I find it remarkable that at the London Hospital there are "empty beds" which cannot be filled. Here we have a "waiting list" of some 800 surgical patients, and I imagine most hospitals have such lists. A general hospital has to take what comes and special interests of the staff can only be met to a limited extent, although co-ordination and good will among the staff and exciting the interest of outside practitioners can, from time to time, provide groups of cases. Unless he has an exceptionally large number of beds, the director would, I think, have usually to forgo such groups; his beds should illustrate all aspects of surgery, particularly because he is likely to handle students at the beginning of their clinical work, starting them on good general lines. I agree with Mr. Souttar in what he implies that—whatever its defects—the surgical teaching in this country at the present day is at least as good as can be obtained elsewhere. I join him in commending the responsibility under supervision which the student assumes at the beginning and throughout his clinical training. With him I condemn the system which limits the student to the lecture theatre and approve the student's immediate contact with patients in wards, at operations, and elsewhere.

The so-called "unit system" is on its trial, but when it has passed through its period of probation I believe that, under some better name, it will win through.—I am, etc.,

A. W. Sheen,
Professor of Surgery and Director of the Surgical Unit, Welsh National School of Medicine; Surgeon, the Royal Infirmary, Cardiff.

October 29th.

Sir,—Mr. H. S. Souttar's letter on the unit system at the London Hospital must be extremely interesting to all those who are engaged in the teaching of the senior subjects of medicine. Mr. Souttar alludes to the difficulties with which he has been confronted and suggests that these may be peculiar to the London Hospital or to himself; but it would seem more likely that they are not due to the unit system *per se*, but to the attempt to introduce it into one of the English hospitals, all of which have hitherto been conducted on very different lines. A new method of teaching or work which differs, or should differ, very considerably from that hitherto in force in English hospitals, is bound to create difficulties.

It is obvious that such a system is workable since the Rotunda Hospital at Dublin has for a long period been in effect an obstetric unit, worked very much on the lines which obtain on the Continent. The fact that the Master of the Rotunda receives his remuneration from the fees of pupils is immaterial; the important difference is that he is allowed to engage in private practice so long as his hospital duties are properly carried out. The duties of the assistant masters and the extern and pathologist are carried out very largely in the manner adopted in Continental units.

Although the system of the Scottish universities—Edinburgh, Glasgow, Aberdeen, and St. Andrews—is not precisely the same, it would seem that the unit system could be established in them with very few minor alterations.

There is no doubt that the head of a unit must always have a considerable amount of routine work to do, but this applies to such subjects as anatomy, physiology, and pathology with almost equal force. In these departments, however, the system has been followed for some years so that it has been possible to adopt the lines of least resistance. There should be little doubt that with a more extended experience in the departments of medicine, surgery, and obstetrics these difficulties would be solved.

As regards private practice, it appears a mistake to debar the head of a unit from consultation work. It has always seemed curious that while the head of a unit is not debarred from any other form of activity in his spare time he is not allowed to undertake consultation work in his own specialty, which is at any rate a means of enlarging his experience.—I am, etc.,

Clifton, Bristol, Oct. 31st. Walter C. Swayne.

OPTICAL ESTIMATION OF BLOOD SUGAR.

Sir,—In the British Medical Journal of October 6th (p. 600) Mr. W. F. Lloyd put forward the suggestion that the refractive index of serums could be used in the estimation of their sugar content.

Having at our disposal a Pulfrich refractometer capable of accurate measurements—the instrument is graduated to read one-tenth of a minute of arc—we have followed up the suggestion, and, as a result of our investigations, consider that a method for the estimation of blood sugar based solely on the variation of the refractive index of serum is impracticable.

In the course of our investigations we made a series of determinations of the refractive index of dilute solutions of sugars. The values obtained are indicated in Table I. The value for the refractive index of cane sugar given in this table is the mean of three readings taken on different days and corrected to 20° C. The temperature coefficient used was 0.00008 per degree Centigrade (the temperature coefficient for water).

Table I.

Strength of Sugar Solutions.	Refractive Index.		
	Dextrose.	Cane Sugar.	Cane Sugar (Landholt and Börnstein).
1.0 per cent.	1.33446	1.33142	1.3344
0.4 ,, ...	1.33357	1.33350	—
0.3 ,, ...	1.33338	1.33371	—
0.2 ,, ...	1.33325	1.33322	—
0.1 ,, ...	1.33312	1.33309	—
Average variation per 0.1 per cent.	0.00015	0.00015	—

Too much reliance should not be placed on the value of the fifth place of decimals, as the following readings, taken on different occasions, show:

0.1% Sugar ...	1.33304	0.2% Sugar ...	1.33325
	1.33309		1.33319
	1.33314		1.33324
Average ...	1.33309	Average ...	1.33322
Diff.	±0.00005	Diff.	∓0.00003

This variation, coupled with the possibilities of slight temperature variations during experiment, renders it impossible to estimate by this method differences of concentration less than 0.05 per cent. dextrose, while it is possible by many chemical methods to estimate variations of 0.01 per cent. or even 0.005 per cent. dextrose.

Another difficulty arises in that the refractive index of human serum is by no means a constant. The following serums—supplied by our bacteriological department—had all been treated identically. In numbers 1 to 4 the Wassermann reaction was negative, in 5 and 6 positive, and in 7 unknown. The proportion of positives and negatives in the pooled serums is unknown.

TABLE II.

	Refractive Index.	Difference from Average.
No. 1	1.35121	+0.00188
No. 2	1.35093	+0.00160
No. 3	1.34875	-0.00058
No. 4	1.34833	-0.00100
No. 5	1.34838	-0.00095
No. 6	1.34875	-0.00058
No. 7	1.34885	-0.00048
(*a*) Pooled	1.34940	+0.00007
(*b*) Pooled	1.34938	+0.00005
Average	1.34933	

It will be seen that individual serums differ from the average by amounts far greater than can be accounted for by any conceivable variation of the sugar content.

As blood serum is a complex solution the difference between its refractive index and that of water may be due to many substances. The chief of these are proteins, salts, and sugars. Considering the salt content as equal to a 0.7 per cent. saline and taking cerebro-spinal fluid as roughly representing serum less the proteins it is possible to get an idea of the importance of each factor.

	Refractive Index.
Water	1.33300
Cerebro-spinal fluid	1.33475
Serum	1.34933
0.7 per cent. NaCl	1.33409

The refractive index of serum may be regarded as made up approximately in the following way:

Water	1.33300
0.7 per cent. NaCl	0.00109
0.1 per cent. sugar	0.00015
Other organic substances (urea) ...	0.00053
Protein	0.01456
	1.34933

The alteration in the refractive index of serum produced by diluting the serum with 0.7 per cent. NaCl is shown below:

Percentage of Serum.	Refractive Index.
100	1.34940
90 (about)	1.34763
80	1.34596
70	1.34446
60	1.34331
50	1.34194

Average difference per 10 per cent. dilution 0.00149.

It will be seen that the dilution of only 1 in 100 of the serum will give an alteration well within the capacity of the instrument, and that for practical purposes the variation in refractive index may be considered as due to alteration in the protein content.

Further work is being undertaken to determine the importance of "the other organic substances" in causing variations in the refractive index of serum, and also with the view to ascertain the degree of correlation between the protein percentage and the refractive index in normal and pathological serums.—We are, etc.,

T. W. ADAMS,
Demonstrator of Physics.
W. W. PAYNE,
Parsons Research Fellow.
Guy's Hospital, S.E., Nov. 2nd.

ANTE-PARTUM HAEMORRHAGE AND ECLAMPSIA.

SIR,—No one interested in the etiology of eclampsia can have failed to have read of Dr. Bradshaw's case in your issue of October 20th or Dr. Johnstone's comments in your issue of October 27th (p. 784). Dr. Bradshaw supposes "that the association of placenta praevia and albuminuria is not uncommon"—and perhaps he is right. Whilst from his experience Dr. Bradshaw limits himself to this conclusion, Dr. Johnstone proceeds to the justification of the placental hypothesis. The association of albuminuria and accidental haemorrhage, he states, is a commonplace; and the usual interpretation that premature placental separation and haemorrhage result from the toxaemia. This interpretation he discredits; in Edinburgh, he says, several cases have been observed in which the albuminuria has not developed until after the partial separation of the placenta had become manifest. In placenta praevia, presumably, a partial separation of the placenta (with autolysis and bleeding) occurs; and poisons thus arise which, being absorbed by adjacent and still adherent cotyledons, reach the maternal blood and cause the toxaemia ending in eclampsia.

This argument, I submit, is erroneous. The declaration that accidental haemorrhage, at times at least, precedes the "toxaemia," is highly significant. It shows that the distension of the uterus (which occurs when such bleeding is concealed—and when it is not concealed the "toxaemia" is much less likely), and the hardness and tenseness of the abdomen which then result, precedes in time that change in the kidneys of which albuminuria is the mark. It is thus reasonable to conclude that the change in the uterus is the factor affecting the kidneys; but whilst all attention has been directed either to the state of the placenta or to the effect of blood extravasation on the uterine wall, the increase in volume of the uterus in such cases, and the effect this may have on other abdominal organs, has not been looked at. That a very great rise of pressure within the abdomen must occur is obvious; and that this is a factor in the genesis of eclampsia is shown by a consideration of the types of case eclampsia "selects." It is further supported by Dr. Johnstone's statement that "where the haemorrhage is followed by labour within a few hours, albuminuria is not observed . . ." My explanation is that with the emptying of the uterus the pressure falls; but Dr. Johnstone believes that in such case "the toxins have not had time to be formed in the dying portion of the placenta."

But the view that placental necrosis occasions that toxaemia leading to eclampsia, I submit, is untenable. In the first place no toxin (other than normal waste products) in the blood in pre-eclampsia or in eclampsia has ever been found; such has only been imputed. And next, apart from the difficulty of supposing that a particularly inimical poison is generated by dying or dead placental cells, and is absorbed by adjacent living placental cotyledons (in spite of their separation by the decidual processes which extend throughout the thickness of the organ), and so gets into the maternal blood, there is the occurrence of innumerable cases of infarct formation without any preceding sign of toxaemia to explain. There are also the cases of eclampsia cured by treatment with the continuation of the pregnancy to explain—even Dr. Bradshaw's case went on for another month, and was only terminated because of the bleeding. Above all else there is the occurrence of chorion-epithelioma, with metastases (in which many syncytial cells undergo autolysis), without this toxaemia arising.

The occurrence of eclampsia with placenta praevia does not support the view that placental necrosis is a cause or the cause of the pre-eclamptic toxaemia. It is not surprising that a multiparous woman with a placenta praevia should come to pass albumin in her urine; multiparous women are usually older than primigravidae, and their kidneys cannot be expected to be as sound. If the cause which occasions eclampsia occurs in a woman with placenta praevia, albuminuria will arise. Dr. Johnstone, in my opinion, misses the essential point—the type of woman affected with eclampsia. Dr. Bradshaw's patient was 35, and had had two children; whether she was a strong and muscular woman we are not told. Such, we know, if leading active lives (running the house), are very prone to eclampsia. I have previously shown that if eclampsia is not associated with great or rapid distension of the abdomen (and so increased intra-abdominal pressure) it is always associated with a strong muscular state and activity. The same association is found in cattle. In cows a disease essentially similar to eclampsia (so I understand) arises; limited to the parturient act, it occurs always in the best developed

animals, in those that have "thrown quickly," in those with the best physique.

The teaching of all this is plain: it is that the toxaemia preceding and causing eclampsia is of mechanical origin—that its rise is to be mechanically explained.—I am, etc.,

London, W., Oct. 28th. R. H. Paramore, F.R.C.S.Eng.

THE TREATMENT OF HAEMORRHOIDS BY INTERSTITIAL INJECTIONS.

Sir,—I was very deeply interested in Dr. Dunbar's article on this subject in the British Medical Journal of November 3rd (p. 808), and was gratified to read that he also is practising this method of treatment with such uniform success, because his experience confirms my own, which has extended now over some nine years and which covers about 4,000 cases.

I was sorry to read, however, that Dr. Dunbar employs only a 10 per cent. solution of carbolic acid in liquid extract of hamamelis. Personally, I always use a 20 per cent. solution of carbolic acid in equal parts of glycerin and water, and I have found this to be far more rapid and certain in its effect than the weaker solution which Dr. Dunbar employs. I have treated a patient recently, who had been under the care of another surgeon, who had given him no less than eleven injections of the solution mentioned by Dr. Dunbar. He continued to suffer haemorrhage from his piles throughout this lengthy treatment, and was still losing blood at every defaecation when he consulted me. This haemorrhage stopped finally after the very first injection of the 20 per cent. solution, and his haemorrhoids had entirely disappeared after five injections at intervals of a week. I have frequently tried solutions weaker than 20 per cent. and have invariably found that the effects are less rapid and perfect. It would be a great pity if the progress of the method were retarded by the adoption of too weak a solution.

Dr. Dunbar falls into the common mistake of attributing the success of the treatment to a process of thrombosis. I have pointed out repeatedly (in my recently published book and in previous articles in this and other journals) that injections do not cause thrombosis, but that they act by setting up an aseptic inflammatory process in the submucous coat of the bowel, which compresses the veins and by its ultimate contraction obliterates them and causes adhesion between the coats of the bowel. That thrombosis does not occur, as stated by Dr. Dunbar, is shown, I think, by the almost complete absence of pain in the majority of cases, and by the complete absence of such complications as embolism, pylephlebitis, and pyaemia, which would be certain to occur occasionally if thrombosis were the usual result of injection. It is just because it is believed by those who have not tried the method that thrombosis is likely to be set up by injection and that embolism and pyaemia are therefore likely to occur in a definite proportion of the cases, that there has been so much reluctance to give the method its proper place as the treatment of choice for haemorrhoids. If Dr. Dunbar's statement that "The thrombosis produced extends along the veins until they perforate the coats of the rectum" is left uncorrected, it will have the effect, I fear, of making his readers extremely nervous of recommending patients to undergo treatment by injection. If thrombosis were really the result of injection of carbolic acid into haemorrhoids, it would be difficult to see why more than one injection should be required. Amongst the 4,000 cases which I have treated by this method, I have only had one definite instance of thrombosis.

I join issue with Dr. Dunbar also when he states that not more than three piles should be treated on any one occasion. I have repeatedly treated as many as six piles at one sitting and have used as much as 40 minims of 20 per cent. carbolic acid, but I have not yet met with a case of carboluria as a result.

If Dr. Dunbar will try the solution I recommend, I venture to predict that his results will be even better than those he records in his very interesting paper, and that he will find that even in the worst cases the symptoms of prolapse and haemorrhage will cease from the moment of the first injection and that his patients will need only from three to six injections at weekly intervals, instead of an average of nine or ten injections usually recommended by those who use the solution Dr. Dunbar employs.

I, like Dr. Dunbar, have tried other solutions, such as that of the hydrochloride of quinine and urea, but I have always returned to the 20 per cent. carbolic acid in glycerin and water, because I find my results are incomparably better with that than with any other.—I am, etc.,

London, W.C., Nov. 3rd. Arthur S. Morley, F.R.C.S.

THE USE AND ABUSE OF OBSTETRIC FORCEPS.

Sir,—With your permission I would like to refer to the discussion on the use and abuse of forceps by the Section of Obstetrics and Gynaecology, reported in the Journal of October 6th.

During the meeting it was manifest that there were two sides debating. The actual point of divergence of opinion, though amply illustrated, was never, I believe, put into words. This crux was "maternal distress," and I submit that it is the estimation of this factor by each individual practitioner that finally governs the use of forceps in general. Instances of gross abuse of this indispensable instrument, such as Mr. Comyns Berkeley quoted, came as a shock to many of his audience, and it is greatly to be hoped that they are rare.

As to the incidence of prolapse, this unfortunate condition undoubtedly follows spontaneous as well as assisted labour. May it not be more the result of labour prolonged beyond the point of ready recuperation in the individual circumstances of each patient? If so, the earlier application of forceps at times actually may be a prophylactic measure; further, the blame attached to the instrument in a proportion of cases may really be due to the delay in its use.

May I also remark that certain figures which I quoted for Caesarean section only applied to those in which all hope that the uterus was still uninfected had been lost before operation?—I am, etc.,

R. Kelson Ford, M.B., B.S.

Municipal Maternity Hospital, Southsea, Nov. 4th.

LARGE PLEURAL EFFUSION.

Sir,—The cases of large pleural effusions described in the issues of the Journal of October 20th and 27th induce me to send some notes of one of mine, which I think may prove to be interesting.

In May, 1910, I was asked to see a young man who had left hospital a week before, and who was supposed to be dying. His relatives stated that they had been told that he was suffering from an incurable solid tumour of his lung. The left chest was dull all over, heart displaced to the right, the glands in the anterior and posterior cervical triangles, axillae, and groins were enlarged, and the skin bronzed. The temperature was normal, but he said that he was subject to "attacks of shivering." He denied having had syphilis, and there was no history of lymphadenoma or tuberculosis in his family. The sputum never contained tubercle bacilli.

A hypodermic needle proved that there was fluid in the left pleural cavity, and with a Dieulafoy's aspirator I removed enough to fill an ordinary wash-hand basin to an unsafe level, and partially fill another. The amount unfortunately was not measured, but must have been at least twelve pints. Three days later I aspirated ten and a half pints, and twice each week, during the succeeding two months, eight to nine pints were withdrawn at each paracentesis.

In the third month the chest refilled so rapidly that it was necessary to increase the number of tappings to three, and then four weekly, and this continued, until at the end of the fifth month he died of coma.

After the first few tappings the patient, far from experiencing discomfort or fear, expressed a wish for a daily paracentesis, watched with interest all that took place, would assist if permitted, and looked forward to twenty-four hours of relief, and even enjoyment.

He was tapped forty-seven times, which is unique for Hodgkin's disease, tubercle, or any other disease as far as I can learn, and the total amount of fluid removed should constitute a record.—I am, etc.,

Bournemouth, Oct. 29th. J. F. Dwyer.

SIR,—I would also like to record a case of large pleural effusion which came under my notice in August, 1918, whilst doing temporary duty at a prisoners of war hospital at Manchester. A German, who no doubt had been rather overlooked owing to the rush of surgical work, had been in the medical ward some weeks, and was reported by the sister as "not much wrong with him." He was getting up every day, and acting as orderly and generally assisting with cleaning, etc., in the ward. I was almost passing him over as he had been passed over before, for he did not look very ill and hardly complained of any symptoms. But on questioning him he said he felt a very slight pain on the left side of his chest and was rather short of breath on exertion. When he had undressed I immediately noticed obvious bulging on the left side. I aspirated the chest with a Potain's aspirator and withdrew a gallon less three ounces of serous fluid. He felt quite fit and much relieved at the end of the operation and was doing well four days afterwards. After that time I was unable to follow the case, as I was ordered to France again.—I am, etc.,

ALLAN DEWAR,
Captain, late R.A.M.C.

Tuxford, Notts, Nov. 3rd.

CHRONIC INTESTINAL STASIS AND CANCER.

SIR,—Sir Arbuthnot Lane in his address on chronic intestinal stasis and cancer published in the BRITISH MEDICAL JOURNAL of October 27th, and in a previous letter to the *Times*, seems to imply that cancer has no other cause than chronic intestinal stasis and that all efforts to discover the origin of cancer which are not based upon this view are mere waste of time and money.

That cancer requires a suitable soil for its development is now perhaps generally admitted, but that that soil is provided solely by the action of intestinal toxins is open to question. How, one may ask, do the toxins of intestinal stasis affect the incidence of cancer upon the scar of an old *x*-ray burn, upon an old scar of lupus, or upon an old syphilitic scar? What have intestinal toxins to do with the pre-cancerous conditions of the skin due to arsenical dermatitis or to the prolonged contact with tar?

It might indeed be argued that these pre-cancerous conditions of the skin, induced by various agents, render the affected part more susceptible to those intestinal toxins which prepare the way for cancer. In that case, those whose skins have unfortunately been burnt by *x* rays or damaged by chronic arsenical poisoning should be able to avoid the subsequent development of cancer by adopting a primitive diet and by swallowing liquid paraffin!

But how can one explain the occurrence of kangri cancer of the abdominal walls in natives of Kashmir, among whom the incidence of cancer is above that of other native races, not as the result of a civilized diet, but because they have the habit of wearing next the skin of the abdomen kangri, or vessels containing live charcoal, which by constant burning of the skin produces a pre-cancerous dermatitis?

Without denying the influence of intestinal stasis in producing cancer of the digestive tract, is it not just as reasonable to suppose that cancer in these parts may be secondary to damage resulting from local inflammatory conditions brought about by stasis, as it is to affirm that degenerative changes due to hypothetical toxins prepare the way for cancer not only in the digestive tract but in all other parts of the body also?—I am, etc.,

H. G. ADAMSON.

London, W., Nov. 6th.

MENSTRUAL DISABILITY.

SIR,—I notice in the JOURNAL for October 13th a letter from Lady Barrett, in which she states: "Now happily the more rational life lived by women to-day has so altered the incidence of pain and malaise during menstruation that, whatever may have been the fact in the past, recent investigation shows that a very small minority of women suffer from any such disability."

My own experience has been the very opposite to this. Since the war I have been very much impressed by the number of girls who are brought to me suffering from great disability during menstruation. Not only that, but the mothers have asked me why so many girls do suffer so much now; because when they were young they hardly ever heard of such a thing.—I am, etc.,

H. FOXTON.

Uttoxeter, Oct. 20th.

LATE RESULTS OF OPERATION FOR CANCER OF THE BREAST.

SIR,—The Medical Society of London has appointed a committee of surgeons to investigate the later results of operations for cancer of the breast. The scope of the inquiry at present is being limited to cases of patients who are known to be alive not less than ten years after the primary operation for undoubted cancer.

A preliminary inquiry has already brought to light the existence of a number of such cases, and the Society is therefore encouraged to make a wider appeal.

The committee would be obliged if any medical practitioner, who has not already been approached, having personal knowledge of any such cases, would communicate with the Honorary Secretaries of the Society.—We are, etc.,

T. P. LEGG,
F. LANGMEAD,
Honorary Secretaries.

11, Chandos Street, Cavendish Square, W., Oct. 27th.

Obituary.

PETER WALLWORK LATHAM, M.A., M.D., F.R.C.P.,

Consulting Physician, Addenbrooke's Hospital, Cambridge; formerly Downing Professor of Medicine.

MANY among the generations of Cambridge medical men during the last sixty years ending 1912 will be reminded by the announcement of Dr. P. W. Latham's death of a once familiar figure in the streets of their Alma Mater, and will feel that a link with the past has gone. For the last ten years he had lived in retirement in London, but still maintained relations with old friends and attended meetings of a social medical club within the last year.

He was born on October 21st, 1832, at Wigan, the eldest son of John Latham, a medical man in that town, but was not related to the famous physicians John and Peter Mere Latham. After serving as apprentice to his father, he continued his medical education at Glasgow, and in 1854 went up to Caius College, Cambridge, where he obtained a scholarship in the following year; in 1858 he was 19th Wrangler in the mathematical tripos, and in 1859 was placed first in the first class of the natural sciences tripos with distinction in no less than five subjects—chemistry, physiology, physics, comparative anatomy, and botany—a record that has never been equalled. He then worked at St. Bartholomew's Hospital, and in a very short time, in 1860, was elected a fellow of Downing College, Cambridge; in the following year he proceeded to the degrees of M.A. and M.B., became a member of the Royal College of Physicians of London, and in April, 1862, was elected assistant physician to the Westminster Hospital.

His professional life in London, however, was short, for in 1863 he returned to Cambridge as physician to Addenbrooke's Hospital and medical lecturer at Downing College. The subject of pulmonary tuberculosis then attracted his attention, and in 1864 he read his M.D. thesis "On the early symptoms of phthisis and the means best adopted to prevent or arrest its development," but unlike his son, who also took up this study at about the same time in his career, he did not make it his life's study. *Nervous or Sick Headache* was the title of a small book, published in 1873, containing two lectures given at Addenbrooke's Hospital in which he urged the importance of bracing up the bodily and nervous systems in the intervals between the attacks by strychnine, iron, and cod-liver oil. *Quain's Dictionary of Medicine* also contained an article by him on this subject. From 1868 to 1874, when he was elected Downing professor of medicine, he acted as deputy for his predecessor Professor W. W. Fisher, who had held the chair since 1841. Probably realizing that a lengthy tenure of office may have its drawbacks for the University, Latham resigned the chair after twenty years' service in 1894; during this period he played an active part in the medical school of the University

then reaching its high success under the leadership of Sir George Humphry and Sir Michael Foster, with whom, however, he did not always see eye to eye. In 1899, at the age of 67, he voluntarily resigned his post as physician to Addenbrooke's Hospital after thirty-six years' service, remaining in Cambridge until 1912, when he settled down in London. In May of this year he moved to 15, Royal York Crescent, Clifton, Bristol, where he died on October 29th, just a week after his ninety-first birthday.

At the Royal College of Physicians, of which he became a Fellow in 1866, and at the time of his death was the Senior Fellow on the list, Latham played an unusually prominent part for a country Fellow, being senior censor (1894) as well as censor (1887-8) and councillor (1886). His Croonian lecture for 1886 "On some points in the pathology of rheumatism, gout, and diabetes" contained a number of formidable-looking chemical formulae, and gave the results of his work on the formation of uric acid previously published in 1884. Two years later he delivered the Harveian Oration dealing with micro-organisms and blood infection. At various times he wrote, as a general physician should, on various aspects of medicine, such as the *Pathology and Treatment of Typhoid Fever* (1893) and on *Rheumatoid Arthritis* (1905), in which he advocated continuous counter-irritation of the spine by blisters applied in the neighbourhood of the cervical and lumbar regions.

In his prime Latham was a handsome and striking personality with a pleasant and genial manner, and was fond of social intercourse. As a careful and sound physician he for many years deservedly enjoyed a large practice in and about Cambridge. His independent mind made him a keen fighter, and he sometimes expressed his views with such conviction that the opposition remained unconverted, if not confirmed in their opinions. But these are matters of long ago and they are mentioned only to show the vigorous mentality of the veteran physician who in his day was a notable character in Cambridge.

H. R.

The funeral took place on November 1st at Canford Cemetery, near Bristol; it was attended only by relatives and intimate friends; the service was conducted by Bishop Clifford.

PERCY WHITTINGTON SAUNDERS, M.B.Toronto, F.R.C.P.Lond.,

Physician to the Royal Free Hospital.

Within three days the Royal College of Physicians has lost its oldest and also one of its junior Fellows. On October 29th Dr. P. W. Latham died full of years and honours. On November 1st Dr. Percy Saunders passed away at the age of 46, just as the strenuous toil of years was reaching fruition. Born and educated in Canada, he gained the degree of M.B. (with gold medal) at the University of Toronto in 1902. Having decided to try his fortune in London, he came to this country and took the M.R.C.P. After holding a succession of posts at the City of London Hospital for Diseases of the Chest, he became connected with the National Hospital for the Paralysed and Epileptic, Queen Square, where he was in turn house-physician, pathologist, registrar, and assistant physician. In 1913 he was appointed assistant physician to the Royal Free Hospital. He contributed a number of articles on neurological subjects to medical literature. During the last five years his health suffered severely from several attacks of influenza, but he finally succumbed, after a long illness, to an obscure form of malignant disease.

Such are the bare facts of his professional career, but they entirely fail to convey any adequate idea of the enormous amount of work Saunders accomplished during the twenty years he spent in London. How well that work was done is sufficiently shown by the way in which he was promoted from post to post at the hospitals with which he was associated, and by the high professional position he attained after coming to this country as a total stranger, to make his way solely by his own merits, without any influence whatsoever. In everything he undertook he gave of his best, working incessantly to the utmost limits, and frequently beyond the limits, of his none too vigorous physical powers. Often, after a long afternoon spent in seeing out-patients and teaching students at the Royal Free Hospital, he would proceed to "The National" to do some work as registrar, would then give a lecture to nurses, and finish up by reading and writing well into the early hours of the morning. Absolutely conscientious in everything he undertook, his colleagues knew that anything he promised to do would be done thoroughly and well to the smallest detail, no matter at what expenditure of time and trouble. In disposition he was singularly shy and retiring, entirely lacking in the arts of self-advertisement and pushfulness. It was no easy matter to penetrate his natural reserve, but once known he was the most faithful of friends, only too ready to sacrifice his own interests on behalf of others, and seemingly incapable of an unkind or ungenerous word or action. His death is a grievous loss to the hospitals he served so faithfully. His sun has gone down while it was yet day, but the influence of his example and of his character will live. Those who knew him best, when they think of the apparent tragedy of his premature death, will recall the lines of Tennyson on another such loss:

> And, doubtless, unto thee is given
> A life that bears immortal fruit
> In those great offices that suit
> The full grown energies of heaven.

WILLIAM HALL, M.R.C.S.,

Leeds.

We regret to record the death of Dr. William Hall, at Headingley, Leeds, on October 31st, in his 90th year. Dr. Hall was the son of a well known Leeds medical practitioner, Mr. Matthew Hall of Wortley, and was born in 1834. When his father died, at the early age of 40, William Hall, although only in his 15th year, was apprenticed to Dr. Radcliffe of Leeds, and in the cholera and typhus epidemics of 1848 and 1849 worked night and day among the poor inhabitants of Leeds. In 1850 he became a surgical dresser to Mr. Sam Smith, surgeon to Leeds Infirmary, and two years later he was dresser to Mr. Teale. He obtained the diploma of M.R.C.S.Eng. and the L.S.A. in 1855, at the age of 21; subsequently he was a clinical assistant to Sir William Gull at Guy's Hospital, and also worked at the Lariboisière Hospital, Paris. He went into practice in Leeds, and became honorary surgeon to the Leeds Women and Children's Hospital and lecturer on midwifery and diseases of women and children at the Leeds School of Medicine; he also held the appointment of factory surgeon for seventeen years. It may be noted that Sir Arthur Mayo-Robson began his distinguished career in Leeds as Dr. Hall's junior partner.

Dr. Hall had a serious illness in 1897, and soon after retired from practice. Not for long, however, was he content with a life of leisure, and on recovering his health he devoted his energies to improving the conditions of the poor children of Leeds. He was one of the pioneers of the child welfare movement and began on an experimental scale the system of providing free meals daily to poor school children. Within a few months he examined 1,600 board school children in Leeds, and found that 600 of them suffered from rickets and had bad teeth; he soon had convincing proof of the efficacy of supplying those children with free meals. The Bradford City Council, as a result of Dr. Hall's experimental work, set a precedent by deciding that poor school children should be fed out of the rates, and Dr. Hall lived to see his pioneer work completed by the passing of an Act of Parliament empowering educational authorities to feed necessitous school children. He also founded the Leeds Barefoot Mission in 1904, which provided clogs and clothing for the children of the poor.

Dr. Hall married Miss Bowe, of Richmond, Yorkshire, who predeceased him, and he is survived by two sons and one daughter. The elder son is Dr. R. H. Hall of Leeds, who succeeded to his father's practice, and the younger son is Mr. Basil Hall of Bradford, president-elect of the British Medical Association.

We are indebted to Sir Clifford Allbutt for the following tribute to Dr. Hall's memory:

When in the early sixties of last century I settled in Leeds Mr. William Hall was gathering around him a substantial junior family practice; while I was living chiefly on

hope. The senior family practices then were of Mr. Joseph Teale, Mr. Wheelhouse, and the brothers Price. As these gentlemen gradually retired Hall moved into the chief position, for he possessed just the blend of qualities proper for family practice; and furthermore a punctual, methodical, faithful way of quietly fulfilling his daily and hourly duties. I suspect Hall never lost a patient save by departures from the district and by deaths in the ordinary course of nature which even he was unable to prevent. Thus practice grew solidly around him. Brilliancy was not in his way, nor adventure; but he was fully competent, of large and various experience, sound in work, kindly and quietly sure of himself. Such a man wins the steady confidence of all who have need of him; and these were many. As his practice grew Hall was able to secure able partners, one of the first of them being Mayo-Robson. I remember at one of our consultations Robson confided to me his love for surgery, and his longing to risk all then present prospects in pursuit of it.

It is interesting to think how beneficent a life is that of such a family physician; for half a century perhaps the aid, the guide, and the solace of hundreds of sufferers young and old. But Mr. Hall was no less effectual as a public benefactor. He worked devotedly during the several typhus epidemics in Leeds, as I, who was then the sole Honorary Physician of the Fever Hospital, knew well. Moreover as Surgeon to the Women and Children's Hospital he was strongly moved to help children, and was, I believe, the first of those who moved in the provision of "school meals." In the joy of seeing hundreds of rosy thriving children from the slums he had his reward. And, modest as he was, one hopes that in the peace of his retirement he had some consciousness of having lived a worthy, faithful, and very useful life.

The death occurred on October 23rd of Dr. ARNOLD HEIGSORN, after an operation for appendicitis. Dr. Heigsorn was one of the Belgian refugees, who, in the early days of the war, abandoned a lucrative practice in Antwerp, where he specialized in radiology, and together with his family fled to London. Soon after his arrival he volunteered for service in the Belgian Army Medical Service, but owing to glaucoma his offer was not accepted. The condition of his eyes gradually became worse, and after several operations he was left with only a very limited visual field in his left eye. Dr. Heigsorn was a man of wide culture, and had a charm which attracted and gained the admiration and affection of all who came in contact with him, either socially or professionally. These will feel a sense of genuine sorrow at his early death. He leaves a widow and two children—a son aged 16, and a daughter 7 years old.

Professor CARL VON HESS, Director of the Munich Ophthalmological Clinic, died recently at the age of 60.

Dr. HEINRICH BIRCHER, a well known authority on military surgery and organizer of the Swiss Army Medical Corps, has died recently at the age of 73.

Universities and Colleges.

UNIVERSITY OF OXFORD.

AT a congregation held on November 1st the degree of Bachelor of Medicine (B.M.) was conferred on A. L. B. Stevens.

Inaugural Lecture.—The Whitley Professor of Bio-Chemistry, Dr. R. A. Peters, will deliver an inaugural lecture in the examination schools on Wednesday, November 14th, at 5 p.m. The subject of the lecture is "A Wonderland of Chemistry."

UNIVERSITY OF DUBLIN.

SCHOOL OF PHYSIC, TRINITY COLLEGE.

THE following candidates have been approved at the examinations indicated:

FINAL M.B., PART I.—*Materia Medica and Therapeutics; Jurisprudence and Hygiene; Pathology and Bacteriology:* *J. F. Wilde, T. W. MacDowell, T. C. Foster W. J. A. M'Mahon, Mary C. Livingston, C. F. D. M'Caldin, Gladys M. A. Lowry, W. H. Coen, P. Coleman, R. T. Cronin, Mary Galvin, G. A. Miller, J. J. Cusack, Augusta M. Young, W. O. Warrington.

In Completion.—G. P. Bamford, D. J. Cussen, J. Cussen, E. C. Dudgeon, C. J. du Plessis, R. W. Harte, L. W. R. Haskins, J. M. Johnston, C. Lord-Flood, R. H. M'Keag, K. F. Mackenzie, Maguire, H. M. Nevin, D. N. Power, F. M. Purcell, J. I. Strasburg, F. J. Swanepoel, C. Wilson.

D.P.H., PART I.—*Chemistry, Bacteriology, Physics, and Meteo* F. Stevenson, W. B. E. M'Crea, G. C. B. Robinson, R. Seale.

PART II.—*Sanitary Engineering. Practical Sanitary Report, Epidemiology, Vital Statistics and Public Health* F. Stevenson, W. B. E. M'Crea, P. M. J. Bobbett, G. C. B. R. Seale.

* Passed on high marks.

ROYAL COLLEGE OF PHYSICIANS OF LONDON.

THE licence of the College has been granted to C. H. Newma Miss Muriel A. Stephens.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.

THE following candidates, having passed the necessary exam tion, have been duly admitted Licentiates in Midwifery of College: B. C. Dasgupta, Cecily M. E. Maude.

The Services.

No. 14 STATIONARY HOSPITAL.

THE fourth annual dinner of the medical officers of No Stationary Hospital will be held on Friday, December 14th, the Trocadero Restaurant, Piccadilly, at 7.45 p.m., under chairmanship of Lieut.-Colonel J. R. Harper, C.B.E. The hono secretaries are Lieut.-Colonel H. M. Perry and Dr. H. L. T 39, Devonshire Place, W.1.

BELFAST UNIVERSITY SERVICES CLUB.

The fifth annual Armistice Dinner of the Belfast Univ Services Club is to be held in Thompson's Restaurant, Dona Place, Belfast, this day (Saturday, November 10th) at 7.15 The address of the honorary secretary is University Union, Bel

The annual general meeting of the club will be held Thompson's the same evening at 6.30.

DEATHS IN THE SERVICES.

Lieut.-Colonel Edward Fawcett, Madras Medical Service, d died at Blackheath on November 1st. He was born on March 1 1847, the son of John Fawcett, of Augharoo, Fermanagh, educated in Dublin, taking the L.R.C.S.I. and L.K.Q.C.P. in and the F.R.C.S.I. in 1879. He entered the I.M.S. as assis surgeon in 1869, attained the rank of brigade surgeon lieuten colonel in 1894, and retired on December 28th, 1899. He ser in the Burma war of 1886-87, was mentioned in dispatches G.G.O. No. 434 of 1887, and received the frontier medal with a cl

Major Edgar John Cecil McDonald, Indian Medical Service, d at sea on October 29th, aged 43. He was the son of the Mr. C. E. McDonald of Ealing, and was educated at Ki College Hospital; he took the M.R.C.S. and L.R.C.P. in 1904, entered the I.M.S. as lieutenant in 1905 and became major in 1 He was serving in civil employ in Assam.

Medical News.

A TELEGRAM to the *Times* from its Toronto correspond announces that a committee has been formed to organ a Banting Medical Research Foundation on lines similar those of the Medical Research Council in England. T committee hopes to raise altogether from one to two mil dollars, and Dr. Banting intends to contribute 10,000 dol out of his share of the Nobel Prize.

AN announcement appears in our advertisement pa informing those who desire to participate in the Governm grant for scientific investigations for 1924 that their appli tions must be received by the Clerk to the Governm Grant Committee, Royal Society, Burlington House, (from whom printed forms of application can be obtained) January 1st next.

ON October 26th the Prince of Wales visited the Dun Royal Infirmary. He was received by Mr. J. C. Bulst, sident; Mr. A. B. Gilroy, vice-president; Mr. Harol Sharp, chairman; and Dr. H. J. C. Gibson, medical sup intendent. After the presentation of members of directorate, matron, and officials, he visited Ward 4, wh Professor Stalker, Dr. L. H. Henderson, and the siste charge were presented. He was thereafter conducted t ward set apart for surgical diseases in children; Profe L. Turton Price, F.R.C.S., Dr. James Dallas, and the si in-charge were presented. The Prince made special inqu concerning the prevalence of tuberculosis, and evinced g interest in learning that the directors of the Royal Infirm possess the Sidlaw Sanatorium, Auchterhouse, which acc modates about fifty children who suffer from this dise The chairman pointed out the operation theatres, *x*-ray electro-therapeutic departments now in course of cons tion, the erection of which has been made possible by munificence of Mrs. Marryat.

THE Fellowship of Medicine and Post-Graduate Medical Association has arranged a refresher course in general medicine and surgery from December 3rd to 15th at the Hampstead General Hospital, with which will be associated the Hospital for Epilepsy and Paralysis, the North-Western Fever Hospital, and Paddington Green Children's Hospital. The course will be a whole-time one, and will include work in all departments. There will also be a course in neurology at the Hospital for Epilepsy and Paralysis, Maida Vale, of which further particulars will be announced later. Full information can be obtained from the Secretary to the Fellowship of Medicine, 1, Wimpole Street, W.

THE annual dinner of the Cambridge Graduates' Club of St. Bartholomew's Hospital will take place on Wednesday, November 21st, at 7.30 p.m., at the Hotel Victoria (King Edward VII Rooms), with Dr. W. Langdon Brown in the chair. The honorary secretaries are Dr. H. N. Burroughes and Mr. Reginald M. Vick.

THE Glasgow University Club, London, will dine at the Trocadero on Thursday, December 6th, at 7.30 p.m., when Lieut.-General Sir W. B. Leishman, K.C.M.G., F.R.S., will be in the chair. Any Glasgow University men, not members of the club, who would like to attend are requested to communicate with the honorary secretaries, 1, Harley Place, N.W.1.

THE first Lloyd Roberts Lecture at the St. Mary's Hospitals, Manchester, will be delivered by Professor A. Donald, M.D., on Friday, November 23rd, at 5 p.m., in the lecture theatre. Members of the medical profession are cordially invited to attend.

AT a sessional meeting of the Royal Sanitary Institute at the Town Hall, Ipswich, on Saturday, November 17th, at 10.30 a.m., discussions will take place on sewage disposal and on tuberculosis in milk. In the afternoon visits will be paid to various municipal undertakings.

AT the opening meeting of the Illuminating Engineering Society to be held at 8 p.m. on Tuesday next (November 13th) at the Royal Society of Arts reports will be presented on recent progress, and a number of novelties, including the Irwin colour filter system and new types of motor-car head lights, will be exhibited.

WE are asked to announce that a concerted effort on behalf of the British Empire Cancer Campaign is being made throughout the Dominions. The Wellington (N.Z.) Branch of the British Red Cross Society reports that an intensive "cancer campaign" has been organized for the middle of this month in the city. The co-operation of the Newspaper Proprietors' Association has been secured and permission has been given to advertise the campaign free of cost on the tramways. In this country a continuous flow of subscriptions is reaching the offices of the British Red Cross Society. Contributions should be sent to the Hon. Sir Arthur Stanley, British Red Cross Society, 19, Berkeley Street, London, W.1, or to any of the branches of Lloyds Bank.

THE opening of the new school of dental surgery at King's College Hospital will take place at Denmark Hill on Monday, November 12th, at 4.45 p.m. The inaugural address will be given by the Right Hon. F. Dyke Acland, M.P., chairman of the Dental Board.

DR. A. V. HILL'S inaugural lecture as Jodrell Professor of Physiology at University College, London, on "The Present Tendencies and the Future Compass of Physiological Science" will shortly be published by the University of London Press.

THE Manchester Children's Hospital, by special permission of the King, will in future be known as the Royal Manchester Children's Hospital.

A PAPER communicated to the Royal Society by Professor T. B. Wood on November 1st reported some experiments by Mr. T. Deighton which led to the conclusion that the basal metabolism of a pig from 75 days upwards was greater in mid-youth than at any other time of life, and that the metabolism after the ingestion of food reaches a maximum after five hours and then declines. A curve of basal metabolism showing its variation with age favoured the conclusion that the increase of metabolism in youth is directly ascribable to growth. In this respect also the pig seems to resemble man.

THE Catherine Gladstone Home at Mitcham has been brought up to date by the Marie Celeste Samaritan Society of the London Hospital, which will maintain and manage it as an annexe of the hospital. It will be formally opened by the Minister of Health at 3 p.m. on Monday, November 19th.

DR. T. P. THOMAS of Brecon was entertained at dinner on October 25th in recognition of his valuable services as honorary secretary of the County Panel Committee, and to commemorate his occupancy of the office of high sheriff. He was also presented with an inscribed silver coffee tray from his medical colleagues.

THE Prince of Wales, as President of the Royal Northern Hospital, Holloway, will open its new casualty department (which is the war memorial of the borough of Islington) on November 27th. Contributions amounting to £12,000 have been received towards the cost of the department, but a further £4,000 is required to open the building free of debt.

THE first lecture of the one hundred and seventieth session of the Royal Society of Arts will be held on Wednesday next, November 14th, at 8 p.m., when M. Edouard Belin will give an address on the electric transmission and reproduction of writing, designs, and photographs without wires. On November 28th Sir H. J. Gauvain will speak on the effect of sun, sea, and open air in the treatment of disease; and on December 5th Dr. A. W. Hill, F.R.S., Director of the Royal Botanic Gardens, Kew, will give an account of the work done there.

THE annual dinner of the London (Royal Free Hospital) School of Medicine for Women will be held at the Savoy Hotel on the evening of Thursday, December 6th.

THE annual dinner of the past and present students of the Royal Dental Hospital of London will be held at the Trocadero Restaurant on Saturday, November 24th, at 6.30 p.m. for 7 precisely, when Mr. G. Northcroft, O.B.E., will preside.

AT the meeting of the Tuberculosis Society to be held at the Margaret Street Hospital, London, W.1, on November 16th, at 8 p.m., Professor Leonard Bernard will give an address on tuberculosis in France.

A MEETING of the Medico-Psychological Association of Great Britain and Ireland will take place on Thursday, November 22nd, at 11, Chandos Street, Cavendish Square, W.1. The chair will be taken by the President, Dr. Edwin Goodall, C.B.E., at 2.45 p.m.

DR. HENRY SALOMON of Leicester has for the second time been awarded, by the Ministry of Health, a Government grant for successful vaccination.

WE are asked to state that the *Textbook of Pathology* by Delafield and Prudden reviewed in our issue of November 3rd (p. 818) is issued in this country by Messrs. John Bale, Sons, and Danielsson.

UNDER the will of Miss Florence Carver, whose father was for many years prominently associated with the Nottingham lace trade, the Nottingham General Hospital will receive a legacy of £40,000.

THE "Toll" system of dealing with short-distance trunk calls, introduced by the Post Office some time ago, has resulted in a marked growth in the traffic. The average daily number of calls to places within the area now covered by the "Toll" exchange was 14,000 before the introduction of the "Toll" system, and it is now 24,500. The Post Office asks us to state that some hundreds of demands are still made each day for "Trunks," although the exchange required is reached by the "Toll" system. It is in the interests of telephone users to avoid the delay thus caused; they are therefore advised to consult the list of exchanges in the "Toll" system shown in the preface to the London Telephone Directory before asking for a short-distance call.

THE Senate of Uruguay recently confirmed a revaccination bill making revaccination obligatory every ten years.

THE fiftieth anniversary of the founding of the New York Laryngological Society will be celebrated on November 15th. This organization, now the Section in Laryngology of the Academy, is believed to be the oldest society in existence of the department which it represents. In connexion with the celebration there will be an exhibition representing the important contributions made to the progress of laryngology in the city of New York.

THE twentieth congress of the Italian Society of Dermatology and Syphiligraphy will be held in Rome from December 20th to 22nd. The subjects to be discussed are herpes (Dr. Mariani) and the various preparations of bismuth in the treatment of syphilis (Dr. Truffi). Further information can be obtained from the secretary, Dr. V. Montesano, Via Campo Marzio 69, Rome.

THE two hundredth anniversary of the death of the celebrated anatomist Antonio Maria Valsalva was celebrated on September 23rd at his birthplace, Imola, in Northern Italy.

DR. L. EMMETT HOLT, vice-president of the American Child Health Association, has been appointed visiting professor of pediatrics to the Peking Union Medical College by the Rockefeller Foundation. Dr. Holt is to conduct a three months' course of lectures, introducing the latest methods in the treatment of child diseases to Chinese medical practitioners.

THE Department of Health of New York City has prohibited the retail sale of veronal, veronal sodium, luminal, luminal sodium, sulphonal, trional, or tetronal except on the written prescription of a registered medical practitioner.

A WEALTHY Persian merchant, Haji Mohammed Hussan Namazi, has recently presented to Shiraz a maternity hospital to provide twelve to fourteen beds, and has promised £100 a month towards its upkeep. Though not a Christian he has placed it under the care of the Church Missionary Society. Medical work was begun by the Church Missionary Society in Shiraz last February, and Dr. Emmeline Stuart, a Glasgow medical graduate, who went out at that time, will be in charge of the hospital. The desire of the donor is that the training of midwives should also be undertaken.

THE late Mr. Frederick Wolfe, solicitor, of York Gate, Regent's Park, N.W., has by his will bequeathed £2,000 to the Middlesex Hospital, as to one-half for the Endowment Fund and one-half for the Cancer Research Fund; £1,000 each to Charing Cross Hospital for the Endowment Fund and King Edward's Hospital Fund for the Endowment Fund, £500 each to the Cancer Hospital, Fulham Road, and the National Hospital for the Paralysed and Epileptic. He also left £100 to every hospital to which he had been an annual subscriber for at least two years preceding his death. The contingent residue of the estate is to go as to one-third to Charing Cross Hospital for the Endowment Fund, two-thirds to the Middlesex Hospital, one being for the Endowment Fund and the other for the Cancer Research Fund.

IN Brazil it is estimated that more than 18,000 persons are bitten by snakes every year, and that 4,000 deaths occur annually from this cause.

ACCORDING to a report of the State Department of Health of South Carolina, U.S.A., an average of over two persons a day are bitten by rabid dogs in that State, and a campaign is being begun to persuade the State legislature to pass a law to compel owners of dogs to have them vaccinated against rabies. The number of persons bitten by rabid dogs has increased from 176 in 1912 to 769 in 1922, and 3,088 persons have received the Pasteur treatment during that period.

DR. JEAN PAUL LANGLOIS, professor of physiology in the University of Paris and editor of the *Revue Générale des Sciences*, died recently at the age of 62.

Letters, Notes, and Answers.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

IN order to avoid delay, it is particularly requested that *ALL* letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London*; telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Mediocera Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh*; telephone, 4361, Central).

QUERIES AND ANSWERS.

DR. GRAHAM GRANT asks to be told of a good intestinal antiseptic for an obstinate case of mucous colitis. He has tried salol, beta-naphthol, castor oil (in large and small doses), dimol, charcoal (the most useful), and lavage with quinine solution; but violent attacks of diarrhoea of an offensive type still persist and debilitate the patient.

TREATMENT OF NEURO-FIBROMATOSIS.

"M.B., F.R.C.S." has under his care a girl, aged 19, who is suffering from neuro-fibromatosis. Small tumours began to appear at the age of 7, and at present there are small, soft, fibrous nodules all over the body, arms, and legs, and some on the forehead and neck; the largest is about the size of a pigeon's egg and the smallest of a pea. The skin is of a yellow tinge with patches of brown pigmentation; some of the larger swellings are bluish in colour and appear to be of a naevoid nature. The girl is mentally developed, but at times moody and irritable; she does not appreciate her defects, and wishes to go into society. Among other things the following have been tried: arsenic, thyroid extract, pituriglandular extracts, excision of the nodules (reported to be fibromata). It is quite impossible to excise all the nodules. Our correspondent asks for suggestions as to (1) the treatment of the condition; (2) any sphere of life in which the patient would not be conscious of her defects. It is unnecessary to take expense into consideration.

ETHYL CHLORIDE–CHLOROFORM SEQUENCE.

DR. A. W. BURTON (South Africa) writes: May I ask for an expression of opinion on the question of the administration of the sequence of ethyl chloride and chloroform for general anaesthesia? British textbooks make very little reference to such a sequence. An American author (Gwathmey) refers to the sequence as a dangerous one, to be avoided at all times. The special points I should like answered are: (*a*) Is such a sequence more dangerous than the administration of chloroform alone on an open mask? (*b*) Is it wise to administer ethyl chloride in a closed inhaler and to follow up with chloroform on an open mask? (*c*) Would any element of risk be minimized by administering ethyl chloride by the open method and then chloroform by the same method? I acted for many months as anaesthetist in a large hospital in the United Kingdom, and must admit that I never once saw such a sequence used, neither did I ever hear of such ever having been used at any time.

INCOME TAX.

Income from Abroad.

"AUSTRALIAN," referring to the reply given to "Victorian" in our issue of November 19th, 1921, asks whether income tax is not collected in this country on the whole of the Australian income less the amount of the Australian tax.

*** The position is as follows: Income arising from securities, stocks, shares, and rents is chargeable to tax on the full income accrued—less the allowance for Dominion income tax—except where the taxpayer concerned is either not domiciled or not ordinarily resident in the United Kingdom. "Victorian" was in the latter class of persons, and as such was entitled to compute his liability on the basis of the sums received in the United Kingdom.

Interest on Unpaid Purchase Money.

"J. D. W." is paying part of the purchase money payable for a practice in instalments, interest being paid from time to time on the amounts outstanding.

*** It is presumed that the interest is payable at a fixed rate per annum. In that case the purchaser should deduct tax at the standard rate on paying the interest to the vendor; the Income Tax Acts provide for this very clearly, and also lay down the definite rule that "interest" must not be deducted in computing the income tax payable on the profits. The purchaser will thus have to account to the Revenue for the tax (as part of the tax paid under Sch. D) whether or not he exercises his right of deducting tax from the interest he pays.

LETTERS, NOTES, ETC.

THE DANGER OF AMYL NITRITE IN COLLAPSE.

A CORRESPONDENT at a recent dental exhibition saw capsules of amyl nitrite being sold along with other drugs for the relief of shock and collapse. He writes to mention a case he recently observed where after the administration of nitrous oxide and oxygen the patient passed into a state of dangerous collapse, with a scarcely perceptible pulse and inaudible heart sounds. Amyl nitrite was given by the anaesthetist, but seemed rather to aggravate the condition; it was improved by the subcutaneous injection of strychnine and digitalis. He questions the propriety of using such a drug as amyl nitrite in the condition.

CANCER AND CARIOUS TEETH.

BRIGADIER-GENERAL F. E. BURNHAM (Winnipeg) writes: A recent issue of the BRITISH MEDICAL JOURNAL contains a note on cancer and carious teeth, by Dr. R. J. Love (Staplehurst, Kent). During a residence of fourteen years Dr. Love found no cancer among the natives of South Africa, and puts forward the theory that carious teeth are the cause of cancer. In this connexion it may be of interest to report that the White Cross treated 20,133 half-starved Albanians in the city of Scutari. They had pyorrhoea. Their teeth had fallen out from scurvy and famine, but among them there was found only one case of cancer, and no case of diabetes or appendicitis.

THE British Drug Houses, Ltd., have issued a pamphlet entitled *Clinical Pathology and the Use of Stains*, which, in addition to giving a price list of standard microscopic stains, includes some useful practical hints on bacteriological, haematological, and histological methods.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 36, 37, 40, 41, and 42 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 38 and 39.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page *237*.